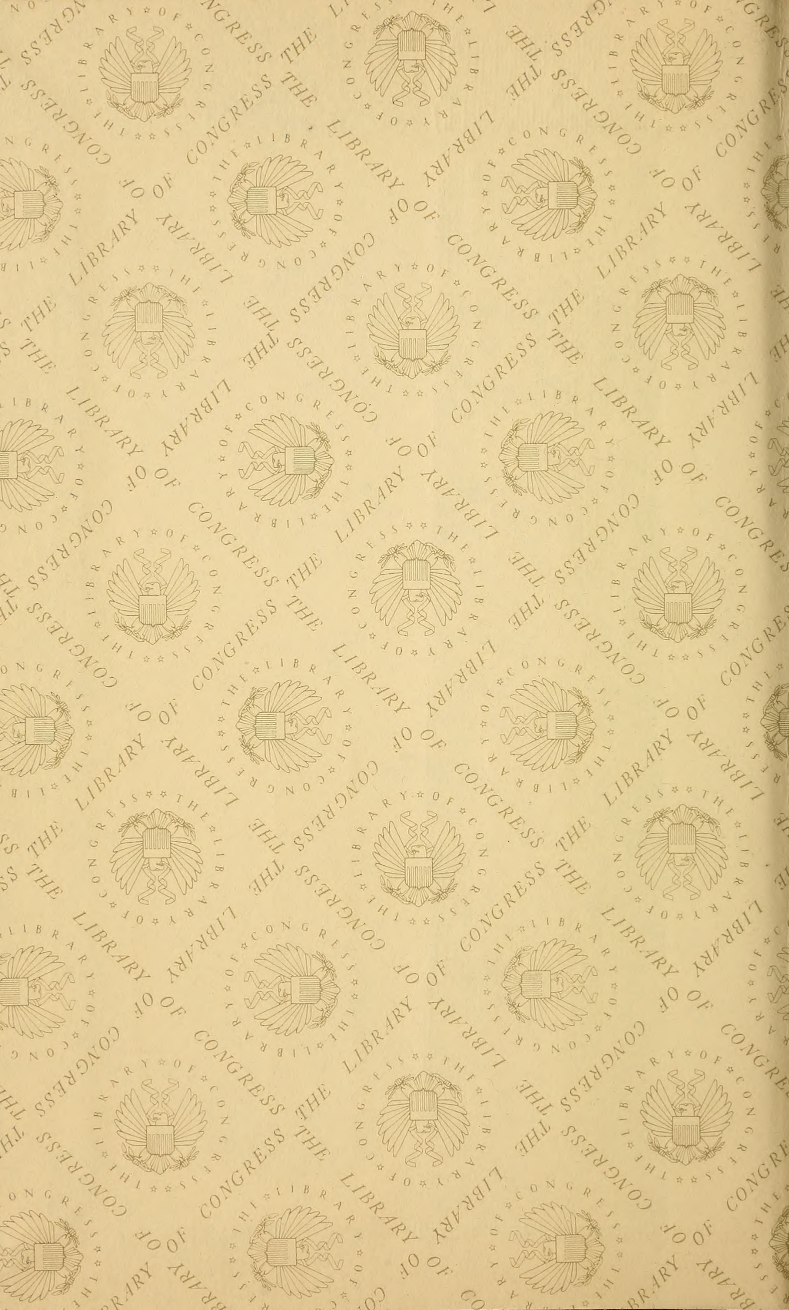

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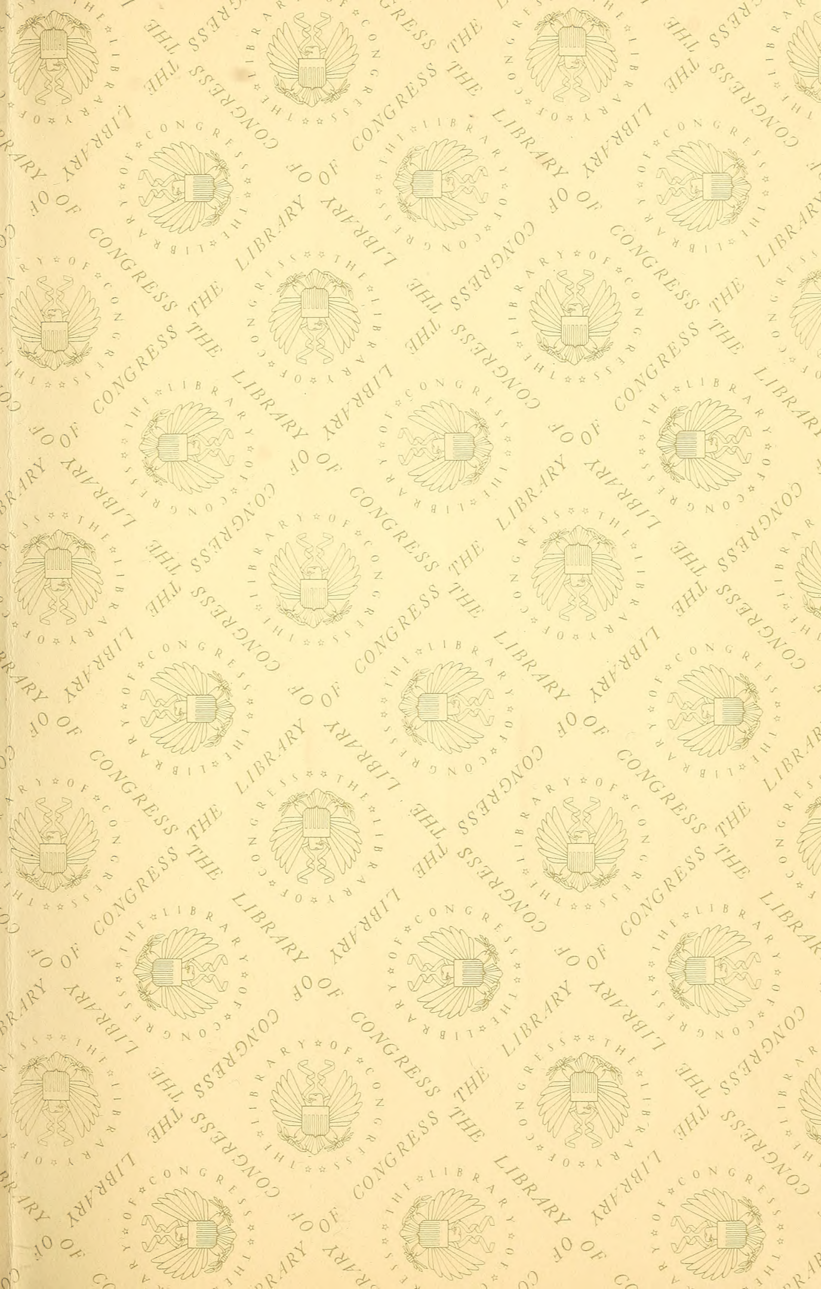
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TO WHICH IS ADDED A LIST OF THE MEDICINES USED IN TREATING CATTLE.

BY ROBERT JENNINGS, V. S.,
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PHILADELPHIA; LATE PROFESSOR OF VETERINARY MEDICINE IN THE AGRICULTURAL
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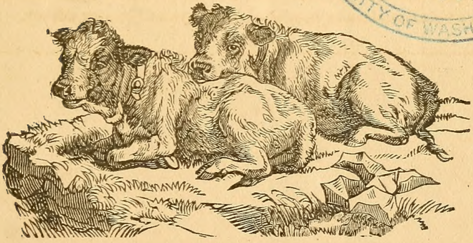

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PHILADELPHIA:
JOHN E. POTTER, No. 617 SANSOM STREET.
NEW YORK:—C. M. SAXTON, No. 25 PARK ROW.
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PREFACE.

A MARKED interest has of late years been manifested in our country relative to the subject of breeding and rearing domestic cattle. This has not been confined to the dairyman alone. The greater portion of intelligent agriculturists have perceived the necessity of paying more attention than was formerly devoted to the improvement and perfection of breeds for the uses of the table as well. In this respect, European cattle-raisers have long taken the precedence of our own.

The gratifying favor with which the author's former publication, "The Horse and his Diseases," has been received by the public, has induced him to believe that a work, similar in spirit and general treatment, upon Cattle, would not be without interest for the agricultural community.

In this belief, the present treatise has been prepared. The author has availed himself of the labors of others in this connection; never, however, adopting results and conclusions, no matter how strongly endorsed, which have been contradicted by his own observation and experience. In a field like the one in question, assuredly, if anywhere, some degree of independent judgment will not be censured by those who are familiar with the sad consequences resulting from the attempted application of theories now universally exploded, but which in the day and generation of their originators were sanctioned and advocated by those who claimed to be magnates in this department.

To the following works, especially, the author acknowledges himself indebted: American Farmer's Encyclopœdia; Stephens's Book of the Farm; Flint's Milch-Cows and Dairy Farming; Laurence on Cattle; Allen's Domestic Animals; Youatt and Martin on Cattle; Thomson's Food of Animals; Allen's Rural Architecture; Colman's Practical Agriculture and Rural Economy; Goodale's Breeding of Domestic Animals; and Prof. Gamgee's valuable contributions to veterinary science.

Particular attention is requested to the division of "Diseases." Under this head, as in his former work, the author has endeavored to detail the symptoms of the most common ailments of cattle in such a manner that every farmer and cattle-owner can at once understand them, and also to suggest such procurable remedies as a wide experience has proved to be most efficacious.

A generous space has been devoted to the consideration of that fatal epidemic, now generally known as "Pleuro-Pneumonia," as it has manifested itself in Europe and this country, in the belief that a matter of such vital importance to the stock-raiser ought to receive a complete exposition in a work like the present. As the author's personal experience in connection with the treatment of this peculiar disease has been, perhaps, as large and varied as that of any American practitioner, he is not without the hope that his views upon the matter may prove productive of some benefit to others.

Should the present volume prove as acceptable to those interested as did his former work, the author will be abundantly satisfied that he has not mistaken in this instance the wants of the public.

PHILADELPHIA, July, 1863.

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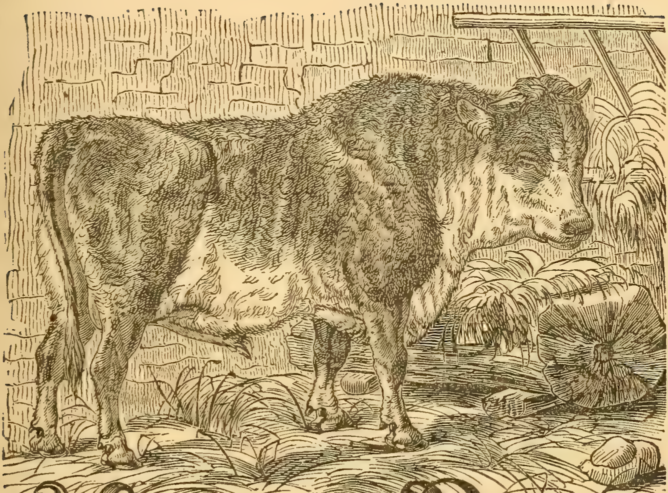


History AND Breeds

IT is quite certain that the ox has been domesticated and in the service of man from a very remote period. We are informed in the fourth chapter of Genesis, that cattle were kept by the early descendants of Adam; Jubal, the son of Lamech—who was probably born during the lifetime of Adam—being styled the father of such as have cattle. The ox having been preserved by Noah from the flood of waters, the original breed of our present cattle must have been in the neighborhood of Mount Ararat. From thence, dispersing over the face of the globe—altering by climate, by food, and by cultivation—originated the various breeds of modern ages.

That the value of the ox tribe has been in all ages and climates highly appreciated, we have ample evidence. The natives of Egypt, India, and Hindostan, seem alike to have placed the cow amongst their deities; and, judging by her usefulness to all classes, no animal could perhaps have been selected whose value to mankind is greater. The traditions, indeed, of every Celtic nation enroll the cow among the earliest productions, and represent it as a kind of divinity.

In nearly all parts of the earth cattle are employed for their labor, for their milk, and for food. In southern Africa they are as much the associates of the Caffre as the horse is of the Arab. They share his toils, and assist him in tending his herds. They are even trained to battle, in which they become fierce and courageous. In central Africa the proudest ebony beauties are to be seen upon the backs of cattle. In all ages they have drawn the plough. In Spain they still trample out the corn; in India they raise the water from the deepest wells to irrigate the thirsty soil of Bengal. When Cæsar invaded Britain they constituted the chief riches of its inhabitants; and they still form no inconsiderable item in the estimate of that country's riches.

The parent race of the ox is said to have been much larger than any of the present varieties. The Urus, in his wild state at least, was an enormous and fierce animal, and ancient legends have thrown around him an air of mystery. In almost every part of the continent of Europe and in every district of England, skulls, evidently belonging to cattle, have been found, far exceeding in bulk any now known.

As the various breeds of cattle among us were introduced into this country from Great Britain, we propose, before going into the details of the leading American breeds, to glance somewhat briefly at the history of

THE BRITISH OX.

In the earliest and most reliable accounts which we possess of the British Isles—the Commentaries of Cæsar—we learn that the ancient Britons possessed great numbers of cattle. No satisfactory description of these cattle occurs in any ancient author; but, with occasional exceptions, we know that they possessed no great bulk or beauty. Cæsar tells us that the Britons neglected tillage and lived on milk and flesh; and this account of the early inhabitants of the British Isle is corroborated by other authors. It was such an occupation and mode of life as suited their state of society. The island was divided into many little sovereignties; no fixed property was secure; and that alone was valuable which could be hurried away at the threatened approach of the invader. Many centuries after this, when—although one sovereign seemed to reign paramount over the whole of the kingdom—there continued to be endless contests among the feudal barons, and therefore that property alone continued to be valuable which could be secured within the walls of the castle, or driven beyond the assailant's reach—an immense stock of provisions was always stored up in the various fortresses, both for the vassals and the cattle; or it was contrived that the latter should be driven to the domains of some friendly baron, or concealed in some inland recess.

When the government became more powerful and settled, and property of every kind was assured a proportionate degree of protection, as well as more equally divided, the plough came into use; agricultural productions were oftener cultivated, the reaping of which was sure after the labor of sowing. Cattle were then comparatively neglected, and for some centuries injuriously so. Their numbers diminished, and their size also seems to have diminished; and it is only within the last century and a half that any serious and successful efforts have been made materially to improve them.

In the comparatively roving and uncertain life which the earlier inhabitants led, their cattle would sometimes stray and be lost. The country was at that time overgrown with forests, and the beasts betook themselves to the recesses of these woods, and became wild and sometimes ferocious. They, by degrees, grew so numerous as to be dangerous to the inhabitants of the neighboring districts. One of the chronicles asserts that many of them harbored in the forests in the neighborhood of London. Strange stories are told of some of them, and, doubtless, when irritated, they were fierce and dangerous enough. As, however, civilization advanced, and the forests became thinned and contracted, these animals were seen more rarely, and at length almost disappeared. A few of them, however, are still to be found in the parks of some of the leading English noblemen, who keep them for ornament and as curiosities.

The color of this wild breed is invariably white, the muzzle being black; the whole of the inside of the ear, and about one-third of the outside, from the tips downward, red; horns white, with black tips, very fine, and bent upward; some of the bulls have a thin, upright mane, about an inch and a half or two inches long. The beef is finely marbled and of excellent flavor.

At the first appearance of any person they set off in full gallop, and at the distance of about two hundred yards, make a wheel around and come boldly up again in a menacing manner; on a sudden they make a full stop at the distance of forty or fifty yards, looking wildly at the object of their surprise; but upon the least motion they all again turn round and fly off with equal speed, but not to the same distance, forming a shorter circle; and, again returning with a more threatening aspect than before, they approach probably within thirty yards, when they again make another stand, and then fly off; this they do several times, shortening their distance and advancing nearer and nearer, till they come within such short distance that most persons think it prudent to leave them.

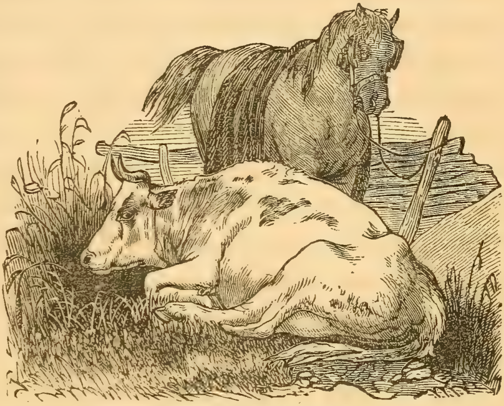
When the cows calve, they hide their calves for a week or ten days in some retired situation, and go and suckle them two or three times a day. If any persons come near the calves they clap their heads close to the ground to hide themselves—a proof of their native wildness. The dams allow no one to touch their young without attacking with impetuous ferocity. When one of the herd happens to be wounded, or has grown weak and feeble through age or sickness, the rest set on it and gore it to death.

The breeds of cattle which are now found in Great Britain, are almost as various as the soil of the different districts or the fancies of the breeders. They have, however, been very conveniently classed according to the comparative size of the horns; the *long-horns*, originally from Lancashire, and established through most of the midland counties; the *short-horns*, generally cultivated in the northern counties and in Lincolnshire, and many of them found in every part of the kingdom where the farmer pays much attention to his dairy, or where a large supply of milk is desired; and the *middle-horns*, a distinct and valuable breed, inhabiting, principally, the north of Devon, the east of Sussex, Herefordshire, and Gloucestershire; and of diminished bulk and with somewhat different character, the cattle of the Scottish and Welsh mountains. The Alderney, with its *crumpled horn*, is found on the southern coast; while the polled, or *hornless*, cattle prevail in Suffolk, Norfolk, and Galloway, whence they were first derived.

These leading breeds, however, have been intermingled in every possible way. They are found pure only in their native districts, or on the estate of some wealthy and spirited individuals. Each county has its own mongrel breed, often difficult to be described, and not always to be traced—neglected enough, yet suited to the soil and the climate; and among small farmers, maintaining their station, in spite of attempts at improvements by the intermixture or the substitution of foreign varieties.

Much dispute has arisen as to the original breed of British cattle. The battle has been sharply fought between the advocates of the middle and of the long-horns. The short-horns and the polls are out of the lists; the latter, although it has existed in certain districts from time immemorial, being probably an accidental variety. The weight of argument appears at present to rest with the middle horns; the long-horns being evidently of Irish extraction.

Great Britain has shared the fate of other nations, and oftener than they been overrun and subjugated by invaders. As the natives retreated they carried with them some portion of their property, consisting, in the remote and early times, principally of cattle. They drove along with them as many as they could, when they retired to the fortresses of North Devon and Cornwall, or the mountainous region of Wales, or when they took refuge in the retirement of East Sussex; and there, retaining all their prejudices, manners, and customs, were jealous of the preservation of that which reminded them of their native country before it yielded to a foreign yoke.



THE WELL-FED BEASTS.

In this way was preserved the ancient breed of British cattle. Difference of climate produced some change, particularly in their bulk. The rich pasturage of Sussex fattened the ox into its superior size and weight. The plentiful, but not so luxuriant, herbage of the north of Devon produced a smaller and more active animal; while the privations of Wales lessened the bulk and thickened the hide of the Welsh stock. As for Scotland, it set its invaders at defiance; or its inhabitants retreated for a while, and soon turned again on their pursuers. They were proud of their country, and of their cattle, their choicest possession; and there, also, the cattle were preserved, unmixed and undegenerated.

Thence it has resulted, that in Devon, in Sussex, in Wales, and in Scotland, the cattle have been the same from time immemorial; while in all the eastern coasts and through every district of England, the breed of cattle degenerated, or lost its original character; it consisted of animals brought from all the neighboring, and some remote districts, mingled in every possible variety, yet conforming to the soil and the climate.

Careful observations will establish the fact, that the cattle in Devonshire, Sussex, Wales, and Scotland are essentially the same. They are middle horned; not extraordinary milkers, and remarkable for the quality rather than the quantity of their milk; active at work, and with an unequalled aptitude to fatten. They have all the characters of the same breed, changed by soil, climate, and time, yet little changed by man. The color, even, may be almost traced, namely: the red of the Devon, the Sussex, and the Hereford; and where only the black are now found, the recollection of the red prevails.

As this volume is intended especially for the farmers of our own country, it is deemed unnecessary in this connection to present any thing additional under the present head, except the names of the prominent species of British cattle. These are, commencing with the middle horns, the North Devon, the Hereford, the Sussex, the Welsh (with the varieties of the Pembrokeshire, the Glamorganshire, the Radnor black, the Anglesea and some others); and the Scotch with its chief varieties, the West Highlanders, the North Highlanders, the North Eastern, the Fife, the Ayrshire, and the Galloways.

As to the long horns, which came originally from Craven, in Yorkshire, it may be remarked that this breed has been rapidly disappearing of late, and has everywhere given place to better kinds. Of this species there are—or perhaps were—two leading classes, the Lancashire and the Leicestershire improved.

Of the short horns, the leading breeds are the Dutch, the Holderness, the Teeswater, the Yorkshire, the Durham, the Northumberland, and some others.

AMERICAN CATTLE.

The breeds of cattle which stock the farms of the United States are all derived from Europe, and, with few exceptions, from Great Britain. The highest breeds at the present time are of comparatively recent origin, since the great improvements in breeding were only commenced at about the period of the American Revolution. The old importations made by the early settlers, must consequently have been from comparatively inferior grades.

In some sections of the Union, and more particularly in New England, the primitive stock is thought to have undergone considerable improvement; whilst in many parts of the Middle, and especially of the Southern States, a greater or less depreciation has ensued. The prevailing stock in the Eastern States is believed to be derived from the North

Devons, most of the excellent marks and qualities of which they possess. For this reason they are very highly esteemed, and have been frequently called the American Devon. The most valuable working oxen are chiefly of this breed, which also contributes so largely to the best displays of beef found in the markets of Boston, New York, and Philadelphia. By means of this domestic stock, and the importations still extensively made of selections from the short horns, and others of the finest European breeds, the cattle, not only of New England, but of other sections, are rapidly improving, especially in the Middle and Western States.

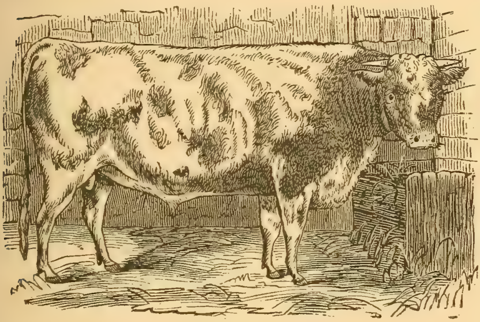
A brief sketch of the principal breeds of American cattle, as well as of the grades or common stock of the country, will be of service to the farmer in making an intelligent selection with reference to the special object of pursuit—whether it be the dairy, the production of beef, or the raising of cattle for work.

In selecting any breed, regard should be had to the circumstances of the individual farmer and the object to be pursued. The cow most profitable for the milk dairy, may be very unprofitable in the butter and cheese dairy, as well as for the production of beef; while, for either of the latter objects, the cow which gave the largest quantity of milk might be very undesirable. A union and harmony of all good qualities must be secured, so far as possible. The farmer wants a cow that will milk well for some years; and then, when dry, fatten readily and sell to the butcher for the highest price. These qualities, often supposed to be utterly incompatible, will be found united in some breeds to a greater extent than in others; while some peculiarities of form have been found, by observation, to be better adapted to the production of milk and beef than others.

It is proposed, therefore, to sketch the pure breeds now found in America.

THE AYRSHIRE.

This breed is justly celebrated throughout Great Britain and this country for its excellent dairy qualities. Though the most recent in their origin, they are pretty distinct from the Scotch and English races. In color, the pure Aryshires are generally red and white, spotted or mottled, not roan like many of the short horns, but often presenting a bright contrast of colors. They are sometimes, though rarely, nearly or quite all red, and sometimes black and white; but the favorite color is red and white brightly contrasted; and, by some, strawberry-color is preferred. The head is small, fine and clean; the face long and narrow at the muzzle, with a sprightly, yet generally mild expression; eye small, smart and lively; the horns short, fine, and slightly twisted upward, set wide apart at the roots; the neck thin; body enlarging from fore to hind quarters; the back straight and narrow, but broad across the loin; joints rather loose and open; ribs rather flat; hind quarters rather



AN AYRSHIRE BULL.

thin; bone fine; tail long, fine, and bushy at the end; hair generally thin and soft; udder light color and capacious, extending well forward under the belly; teats of the cow of medium size, generally set regularly and wide apart; milk-veins prominent and well developed. The carcass of the pure bred Ayrshire is light, particularly the fore quarters, which is considered by good judges as an index of great milking qualities; but the pelvis is capacious and wide over the hips.

On the whole, the Ayrshire is good looking, but wants some of the symmetry and aptitude to fatten which characterize the short horn, which is supposed to have contributed to build up this valuable breed on the basis of the original stock of the county of Ayr, which extends along the eastern shore of the Firth of Clyde, in the southwestern part of Scotland.

The original stock of this country are described as of a diminutive size, ill fed, ill shaped, and yielding but a scanty return in milk. They were mostly of a black color, with large stripes of white along the chine and ridge of their backs, about the flanks, and on their faces. Their horns were high and crooked, having deep ringlets at the root—the surest proof that they were but scantily fed; the chine of their backs stood up high and narrow; their sides were lank, short, and thin; their hides thick and adhering to the bones; their pile was coarse and open; and few of them gave more than six or eight quarts of milk a day when in their best condition, or weighed, when fat, more than from a hundred to a hundred and sixty pounds avoirdupois, rejecting offal.

A wonderful change has since been made in the condition, aspect, and qualities of the Ayrshire dairy stock. They are now almost double the size, and yield about four times the quantity of milk that the Ayrshire cows formerly yielded. A large part of this improvement is due to better feeding and care, but much, no doubt, to judicious crossing. Strange as it may seem, considering the modern origin of this breed, all that is certainly known touching it is, that about a century and a half ago there was no such breed as Ayrshire in Scotland. The question has therefore arisen, whether these cattle came entirely from a careful selection of the best native breed. If they did, it is a circumstance without a parallel in the history of agriculture. The native breed may indeed be ameliorated by careful selection; its value may be incalculably increased; some good qualities, some of its best qualities, may be developed for the first time; but yet there will be some resemblance to the original stock, and the more the animal is examined, the more clearly can be traced the characteristic points of the ancestor, although every one of them is improved.

Youatt estimates the daily yield of an Ayrshire cow, for the first two or three months after calving, at five gallons a day, on an average; for the next three months, at three gallons; and for the next four months, at one gallon and a half. This would give eight hundred and fifty gallons as the annual average; but, allowing for some unproductive cows, he estimates the average of a dairy at six hundred gallons a year for each cow. Three gallons and a half of the Ayrshire cow's milk will yield one and a half pounds of butter. Some have estimated the yield still higher.

One of the four cows originally imported into this country by John P. Cushing, Esq., of Massachusetts, gave in one year three thousand eight hundred and sixty-four quarts, beer measure, or about nine hundred and sixty-six gallons, at ten pounds the gallon; being an average of over ten and a half beer quarts a day for the entire year. The first cow of this breed, imported by the Massachusetts Society, for the Promotion of Agriculture, in 1837, yielded sixteen pounds of butter a week for several successive weeks, on grass feed only. It should be borne in mind, in this connection, that the climate of New England is less favorable to the production of milk than that of England and Scotland, and that no cow imported after arriving at maturity can be expected to yield as much, under the same circumstances, as one bred on the spot where the trial is made, and perfectly acclimated.

On excellent authority, the most approved shape and marks of a good dairy cow are as follows: Head small, long, and narrow toward the muzzle; horns small, clear, bent, and placed at considerable distance from each other; eyes not large, but brisk and lively; neck slender and long, tapering toward the head, with a little loose skin below; shoulders and fore quarters light and thin; hind quarters large and broad; back straight, and joints slack and open; carcass deep in the rib; tail small and long, reaching to the heels; legs small and short, with firm joints; udder square, but a little oblong, stretching forward, thin skinned and capacious, but not low hung; teats or paps small, pointing outward, and at a considerable distance from each other; milk-veins capacious and prominent; skin loose, thin, and soft like a glove; hair short, soft, and woolly; general figure, when in flesh, handsome and well proportioned.

If this description of the Ayrshire cow be correct, it will be seen that her head and neck are remarkably clean and fine, the latter swelling gradually toward the shoulders, both parts being unencumbered with superfluous flesh. The same general form extends backward, the fore quarters being light, the shoulders thin, and the carcass swelling out toward the hind quarters, so that when standing in front of her it has the form of a blunted wedge. Such a structure indicates very fully developed digestive organs, which exert a powerful influence on all the functions of the body, and especially on the secretion of the milky glands, accompanied with milk-veins and udder partaking of the same character as the stomach and viscera, being large and capacious, while the external skin and interior walls of the milk-glands are thin and elastic, and all parts arranged in a manner especially adapted for the production of milk.

A cow with these marks will generally be of a quiet and docile temper, which greatly increases her value. A cow that is of a quiet and contented disposition feeds at ease, is milked with ease, and yields more than one of an opposite temperament; while, after she is past her usefulness as a milker, she will easily take on fat, and make fine beef and a good quantity of tallow, because she feeds freely, and when dry the food which went to make milk is converted into fat and flesh. But there is no breed of cows with which gentleness of treatment is so indispensable as with the Ayrshire, on account of her naturally nervous temperament. If she receives other than kind and gentle treatment, she will often resent it with angry looks and gestures, and withhold her milk; and if such treatment is long continued, will dry up;

but she willingly and easily yields it to the hand that fondles her, and all her looks and movements toward her friends are quiet and mild.

The Ayrshires in their native country are generally bred for the dairy, and for no other object; and the cows have justly obtained a world-wide reputation for this quality. The oxen are, however, very fair as working cattle, though they cannot be said to excel other breeds in this respect. The Ayrshire steer may be fed and turned at three years old; but for feeding purposes the Ayrshires are greatly improved by a cross with the short horns, provided regard is had to the size of the animal. It is the opinion of good breeders that a high-bred short horn bull and a large-sized Ayrshire cow will produce a calf which will come to maturity earlier, and attain greater weight, and sell for more money than a pure-bred Ayrshire. This cross, with feeding from the start, may be sold fat at two or three years old, the improvement being most noticeable in the earlier maturity and size.

In the cross with the short horn, the form ordinarily becomes more symmetrical, while there is, perhaps, little risk of lessening the milking qualities of the offspring, if sufficient regard is paid to the selection of the individual animals to breed from. It is thought by some that in the breeding of animals it is the male which gives the external form, or the bony and muscular system of the young, while the female imparts the respiratory organs, the circulation of the blood, the organs of secretion, and the like.

If this principle be true, it follows that the milking qualities come chiefly from the mother, and that the bull cannot materially alter the conditions which determine the transmission of these qualities, especially when they are as strongly marked as they are in this breed.

Until, however, certain mooted questions connected with breeding are definitively settled, it is the safest plan, in breeding for the dairy, to adhere to the rule of selecting only animals whose progenitors on both sides have been distinguished for their milking qualities.

It may be stated, in conclusion, that for purely dairy purposes the Ayrshire cow deserves the first place. In consequence of her small, symmetrical, and compact body, combined with a well-formed chest and a capacious stomach, there is little waste, comparatively speaking, through the respiratory system; while at the same time there is very complete assimilation of the food, and thus she converts a very large proportion of her food into milk. So remarkable is this fact, that all dairy farmers who have any experience on the point, agree in stating that *an Ayrshire cow generally gives a larger return of milk for the food consumed than a cow of any other breed.* The absolute quality may not be so great, but it is obtained at a less cost; and this is the point upon which the question of profit depends. The best milkers which have been known in this country were grade Ayrshires, larger in size than the pure bloods, but still sufficiently high grades to give certain signs of their origin. This grade would seem to possess the advantage of combining, to some extent, the two qualities of milking and adaptation to beef; and this is no small recommendation of the stock to farmers situated as American farmers are, who wish for milk for some years and then to turn over to the butcher.

THE JERSEY.

These cattle are now widely known in this country. Many of them have been imported from an island of the same name in the British Channel, near the coast of France, and they may now be considered, for all practical purposes, as fully acclimated. They were first introduced, upward of thirty years ago, from the channel islands, Alderney, Guernsey, and Jersey.

This race is supposed to have been originally derived from Normandy, in the northern part of France. The cows have been long celebrated for the production of very rich milk and cream, but till within the last twenty-five or thirty years they were comparatively coarse, ugly, and ill-shaped. Improvements have been very marked, but the form of the animal is still far from satisfying the eye.

The head of the pure Jersey is fine and tapering, the cheek small, the throat clean, the muzzle fine and encircled with a light stripe, the nostril high and open; the horns smooth, crumpled, but not very thick at the base, tapering and tipped with black; ears small and thin, deep orange color inside; eyes full and placid; neck straight and fine; chest broad and deep; barrel hoofed, broad and deep, well ribbed up; back straight from the withers to the hip, and from the top of the hip to the setting of the tail; tail fine, at right angles with the back, and hanging down to the hocks; skin thin, light color, and mellow, covered with fine soft hair; fore legs short, straight and fine below the knee, arm swelling and full above; hind quarters long and well filled; hind legs short and straight below the hocks, with bones rather fine, squarely placed, and not too close together; hoofs small; udder full in size, in line with the belly, extending well up behind; teats of medium size, squarely placed and wide apart, and milk-veins very prominent. The color is generally cream, dun, or yellow, with more or less of white, and the fine head and neck give the cows and heifers a fawn-like appearance, and make them objects of attraction in the park; but the hind quarters are often too narrow to work well, particularly to those who judge animals by the amount of fat which they carry.

It should be borne in mind, however, that a good race of animals is not always the most beautiful, as that term is generally understood. Beauty in stock has no invariable standard. In the estimation of some, it results mainly from fine forms, small bones, and close, compact frames; while others consider that structure the most perfect, and therefore the most beautiful, which is best adapted to the use for which it is destined. With such, beauty is relative. It is not the same in an animal designed for beef and in one designed for the dairy or for work. The beauty of a milch cow is the result of her good qualities. Large milkers are very rarely cows that please the eye of any but a skillful judge. They are generally poor, since their food goes mainly to the production of milk, and because they are selected with less regard to form than to good milking qualities. The prevailing opinion as to the beauty of the Jersey, is based on the general appearance of the cow when in milk—no experiments in feeding exclusively for beef having been made public, and no opportunity to form a correct judgment from actual observation having been furnished; and it must be confessed that the general appearance of the breed would amply justify the hasty conclusion.

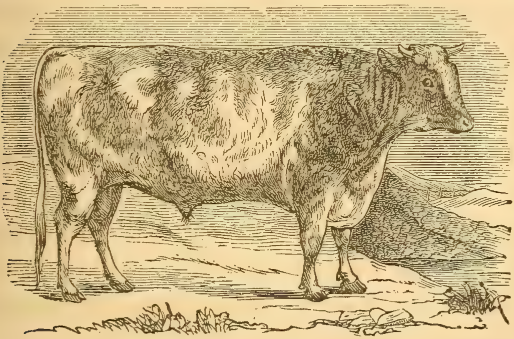
The bulls are usually very different in character and disposition from the cows, and are much inclined to become restive and cross at the age of two or three years, unless their treatment is uniformly gentle and firm.

The Jersey is to be regarded as a dairy breed, and that almost exclusively. It would not be sought for large dairies kept for the supply of milk to cities; for, though the quality would gratify the customer, the quantity would not satisfy the owner. The place of the Jersey cow is rather in private establishments, where the supply of cream and butter is a sufficient object; or, in limited numbers, to add richness to the milk of large butter dairies. Even one or two good Jersey cows with a herd of fifteen or twenty, will make a great difference in the quality of the milk and butter of the whole establishment; and they would probably be profitable for this, if for no other object.

THE SHORT HORNS.

No breed of cattle has commanded more universal admiration during the last half century than the improved short horns, whose origin can be traced back for nearly a hundred years. According to the best authorities, the stock which formed the basis of improvement existed equally in Yorkshire, Lincolnshire, Northumberland, and the adjoining counties; and the pre-eminence was accorded to Durham, which gave its name to the race, from the more correct principles of breeding which seem to have obtained there.

There is a dispute among the most eminent breeders as to how far it owes its origin to early importations from Holland, whence many superior animals were brought for the purpose of improving the old long horned breed. A large race of cattle had existed for many years on the western shores of the continent of Europe. As early as 1633, they were imported from Denmark into New England in considerable numbers, and thus laid the foundation of a valuable stock in this country. They extended along the coast, it is said, through Holland to France. The dairy formed a prominent branch of farming at a very early date in Holland, and experience led to the greatest care in the choice and breeding of dairy stock. From these cattle many selections were made to cross over to the counties of York and Durham. The prevailing color of the large Dutch cattle was black and white, beautifully contrasted.



A SHORT HORN BULL.

The cattle produced by these crosses a century ago were known by the name of "Dutch." The cows selected for crossing with the early imported Dutch bulls were generally long horned, large boned, coarse animals, a fair type of which was found in the old "Holderness" breed of Yorkshire—slow feeders, strong in the shoulder, defective in the fore quarter, and not very profitable to the butcher, their meat being coarse and uninviting. Their milking qualities were good, surpassing those, probably, of the improved short horns. Whatever may be the truth with regard to these crosses, and however far they proved effective in creating or laying the foundation of the modern improved short horns, the results of the efforts made in Yorkshire and some of the adjoining counties were never so satisfactory to the best judges as those of the breeders along the Tees, who selected animals with greater reference to fineness of bone and symmetry of form, and the animals they bred soon took the lead and excited great emulation in improvement.

Importations of short horns have been frequent and extensive into the United States within the last few years, and this famous breed is now pretty generally diffused over the country.

The high-bred short horn is easily prepared for a show, and, as fat will cover faults, the temptation is often too great to be resisted; and hence it is not uncommon to see the finest animals rendered unfit for breeding purposes by over-feeding. The race is susceptible of breeding for the production of milk, as several families show, and great milkers have often been known among pure-bred animals; but it is more common to find it bred mainly for the butcher, and kept accordingly. It is, however, a well-known fact, that the dairies of London are stocked chiefly with short horns and Yorkshires, or high grades between them, which, after being milked as long as profitable, feed equal, or nearly so, to pure-bred short horns.

It has been said, by very good authority, that the short horns improve every breed with which they cross.

The desirable characteristics of the short horn bull may be summed up, according to the judgment of the best breeders, as follows: He should have a short but fine head, very broad across the eyes, tapering to the nose, with a nostril full and prominent; the nose itself should be of a rich flesh color; eyes bright and mild; ears somewhat large and thin; horns slightly covered and rather flat, well set on; a long, broad, muscular neck; chest wide, deep, and projecting; shoulders fine, oblique, well formed into the chine; fore legs short, with upper arm large and powerful; barrel round, deep, well-ribbed horns; hips wide and level; back straight from the withers to the setting on of the tail, but short from hips to chine; skin soft and velvety to the touch; moderately thick hair, plentiful, soft, and mossy. The cow has the same points in the main, but her head is finer, longer, and more tapering; neck thinner and lighter, and shoulders more narrow across the chine.

The astonishing precocity of the short horns, their remarkable aptitude to fatten, the perfection of their forms, and the fineness of their bony structure, give them an advantage over most other races when the object of breeding is for the shambles. No animal of any other breed can so rapidly transform the stock of any section around him as the improved short horn bull.

It does not, however, follow that the high-bred short horns are unexceptionable, even for beef. The very exaggeration, so to speak, of the qualities which make them so valuable for the improvement of other and less perfect races, may become a fault when wanted for the table. The very rapidity with which they increase in size is thought by some to prevent their meat from ripening up sufficiently before being hurried off to the butcher. The disproportion of the fatty to the muscular flesh, found in this to a greater extent than in races coming more slowly to maturity, makes the meat of the thorough-bred short horn, in the estimation of some, less agreeable to the taste, and less profitable to the consumer; since the nitrogenous compounds, true sources of nutriment, are found in less quantity than in the meat of animals not so highly bred.

In sections where the climate is moist, and the food abundant and rich, some families of the short horns may be valuable for the dairy; but they are most frequently bred exclusively for beef in this country, and in sections where they have attained the highest perfection of form and beauty, so little is thought of their milking qualities that they are often not milked at all, the calf being allowed to run with the dam.

THE DUTCH.

This short horned race, in the opinion of many—as has been previously remarked—contributed largely, about a century ago, to build up the Durham or Teeswater stock. It has been bred with special reference to dairy qualities, and is eminently adapted to supply the wants of the dairy farmer. The cows of North Holland not only give a large quantity, but also a very good quality, so that a yield of sixteen to twenty-five quarts, wine measure, at every milking, is not rare.

The principles upon which the inhabitants of Holland practise, in selecting a cow from which to breed, are as follows: She should have, they say, considerable size—not less than four and a half or five feet girth, with a length of body corresponding; legs proportionally short; a finely formed head, with a forehead or face somewhat concave; clear, large, mild and sparkling eyes, yet with no expression of wildness; tolerably large and stout ears, standing out from the head; fine, well curved horns; a rather short, than long, thick, broad neck, well set against the chest and withers; the front part of the breast and shoulders must be broad and fleshy; the low-hanging dewlap must be soft to the touch; the back and loins must be properly projected, somewhat broad, the bones not too sharp, but well covered with flesh; the animal should have long curved ribs, which form a broad breast bone; the body must be round and deep, but not sunken into a hanging belly; the rump must not be uneven, the hip-bones should not stand out too broad and spreading, but all the parts should be level and well filled up; a fine tail, set moderately high up and tolerably long, but slender, with a thick, bushy tuft of hair at the end, hanging down below the hocks; the legs must be short and low, but strong in the bony structure; the knees broad, with flexible joints; the muscles and sinews must be firm and sound, the hoofs broad and flat, and the position of the legs natural, not too close and crowded; the hide, covered with fine glossy hair, must be soft and mellow to the touch, and set loose upon the body. A large, rather long, white and loose udder, extending well back, with four long teats, serves also as a characteristic mark of a good milch cow. Large and prominent milk-veins must extend from the navel back to the udder; the belly of a good milch cow should not be too deep and hanging. The color of the North Dutch cattle is mostly variegated. Cows with only one color are no favorites. Red or black variegated, gray and blue variegated, roan, spotted and white variegated cows, are especially liked

THE HEREFORD.

These cattle derive their name from a county in the western part of England. Their general characteristics are a white face, sometimes mottled; white throat, the white generally extending back on the neck, and sometimes, though rarely, still further along on the back. The color of the rest of the body is red, generally dark, but sometimes light. Eighty years ago the best Hereford cattle were mottled or roan all over; and some of the best herds, down to a comparatively recent period, were either all mottled, or had the mottled or speckled face.

The expression of the face is mild and lively; the forehead open, broad, and large; the eyes bright and full of vivacity; the horns glossy, slender and spreading; the head small, though larger than, and not quite so clear as, that of the Devons; the lower jaw fine; neck long and slender; chest deep; breast-bone large, prominent, and very muscular; the shoulder-blade light; shoulder full and soft; brisket and loins large; hips well developed, and on a level with the chine; hind quarters long and well filled in; buttocks on a level with the back, neither falling off nor raised above the hind quarters; tail slender, well set on; hair fine and soft; body round and full; carcass deep and well formed, or cylindrical; bone small; thigh short and well made; legs short and straight, and slender below the knee; as handlers very excellent, especially mellow to the touch on the back, the shoulder, and along the sides, the skin being soft, flexible, of medium thickness, rolling on the neck and the hips; hair bright; face almost bare, which is characteristic of pure Herefords.

They belong to the middle horned division of the cattle of Great Britain, to which they are indigenous, and have been improved within the last century by careful selections.

Hereford oxen are excellent animals, less active but stronger than the Devons, and very free and docile. The demand for Herefords for beef prevents their being much used for work in their native county, and the farmers there generally use horses instead of oxen.

It is generally conceded that the qualities in which Herefords stand pre-eminent among the middle-sized breeds are in the production of oxen and their superiority of flesh. On these points there is little chance of their being excelled. It should, however, be borne in mind that the best oxen are not produced from the largest cows; nor is a superior quality of flesh, such as is considered very soft to the touch, with thin skin. It is the union of these two qualities which often characterizes the short horns; but Hereford breeders—as a recent writer remarks—should endeavor to maintain a higher standard of excellence—that for which the best of the breed have always been esteemed—a moderately thick, mellow hide, with a well apportioned combination of softness with elasticity. A sufficiency of hair is also desirable, and if accompanied with a disposition to curl moderately, it is more in esteem; but that which has a harsh and wiry feel is objectionable.

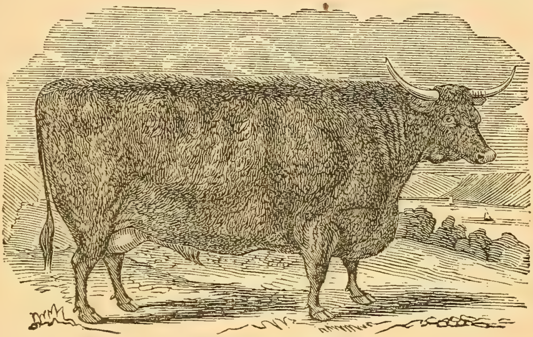
In point of symmetry and beauty of form, the well bred Herefords may be classed with the improved short horns, though they arrive somewhat more slowly at maturity, and never attain such weight. Like the improved short horns, they are chiefly bred for beef, and their beef is of the best quality in the English markets, commanding the highest price of any, except, perhaps, the West Highlanders. The short horn produces more beef at the same age than the Hereford, but consumes more food in proportion.

The Herefords are far less generally spread over England than the improved short horns. They have seldom been bred for milk, as some families of the latter have; and it is not very unusual to find pure-bred cows incapable of supplying milk sufficient to nourish their calves. They have been imported to this country to some extent, and several fine herds exist in different sections; the earliest importations being those of Henry Clay, of Kentucky, in 1817.

The want of care and attention to the udder, soon after calving, especially if the cow be on luxuriant grass, often injures her milking properties exceedingly. The practice in the county of Hereford has generally been to let the calves suckle from four to six months, and bull calves often run eight months with the cow. But their dairy qualities are perhaps as good as those of any cattle whose fattening properties have been so carefully developed; and, though it is probable that they could be bred for milk with proper care and attention, yet, as this change would be at the expense of other qualities equally valuable, it would evidently be wiser to resort to other stock for the dairy.

THE NORTH DEVONS.

This beautiful race of middle horned cattle dates further back than any well established breed among us. It goes generally under the simple name of Devon; but the cattle of the southern part of the county, from which the race derives its name, differ somewhat from those of the northern, having a larger and coarser frame, and far less tendency to fatten, though their dairy qualities are superior.


A NORTH DEVON STEER.

The North Devons are remarkable for hardihood, symmetry and beauty, and are generally bred for work and for beef, rather than for the dairy. The head is fine and well set on; the horns of medium length, generally curved; color usually bright blood-red, but sometimes inclining to yellow; skin thin and orange-yellow; hair of medium length, soft and silky, making the animals remarkable as handlers; muzzle of the nose white; eyes full and mild; ears yellowish, or orange-color inside, of moderate size; neck rather long, with little dewlap; shoulders oblique; legs small and straight, with feet in proportion; chest of good width; ribs round and expanded; loins of first-rate quality, long, wide, and fleshy; hips round, of medium width; rump level; tail full near the setting on, tapering to the tip; thighs of the bull and ox muscular and full, and high in the flank, though in the cow sometimes thought to be light; the size medium, generally called small. The proportion of meat on the valuable parts is greater, and the offal less, than on most other breeds, while it is well settled that they consume less food in its production. The Devons are popular with the Smithfield butchers, and their beef is well marbled or grained.

As working oxen, the Devons perhaps excel all other races in quickness, docility, beauty, and the ease with which they are matched. With a reasonable load, they are said to be equal to horses as walkers on the road, and when they are no longer wanted for work they fatten easily and turn well.

As milkers, they do not excel—perhaps they may be said not to equal—the other breeds, and they have a reputation of being decidedly below the average. In their native country the general average of the dairy is one pound of butter a day during the summer. They are bred for beef and for work, and not for the dairy; and their yield of milk is small, though of a rich quality. Several animals, however, of the celebrated Patterson herd would have been remarkable as milkers even among good milking stock.

Still, the faults of the North Devon cow, considered as a dairy animal, are too marked to be overlooked. The rotundity of form and compactness of frame, though they contribute to her remarkable beauty, constitute an objection to her for this purpose: since it is generally admitted that the peculiarity of form which disposes an animal to take on fat is somewhat incompatible with good milking qualities. On this account, Youatt—who is standard authority in such matters—says that for the dairy the North Devon must be acknowledged to be inferior to several other breeds. The milk is good, and yields more than the average proportion of cream and butter; but it is deficient in quantity. He also maintains that its property as a milker could not be improved without producing a certain detriment to its grazing qualities. Distinguished Devon breeders themselves have come to the same conclusion upon this point. The improved North Devon cow may be classed, in this respect, with the Hereford, neither of which has well developed milk-vessels—a point of the utmost consequence to the practical dairyman.

NATIVE CATTLE.

The foregoing comprise the pure-bred races in America; for, though other and well-established breeds—like the Galloways, the long horns, the Spanish, and others—have, at times, been imported, and have had some influence on our American stock, yet they have not been kept distinct to such an extent as to become the prevailing stock of any particular section.

A large proportion, however—by far the largest proportion, indeed—of the cattle known among us cannot be included under any of the races to which allusion has been made; and to the consideration of this class the present article is devoted.

The term "breed"—as was set forth in the author's treatise, "The Horse and his Diseases"—when properly understood, applies only to animals of the same species, possessing, besides the general characteristics of that species, other characteristics peculiar to themselves, which they owe to the influence of soil, climate, nourishment, and the habits of life to which they are subjected, and which they transmit with certainty to their progeny. The characteristics of certain breeds or families are so well marked, that, if an individual supposed to belong to any one of them were to produce an offspring not possessing them, or possessing them only in part, with others not belonging to the breed, it would be just ground for suspecting a want of purity of blood.

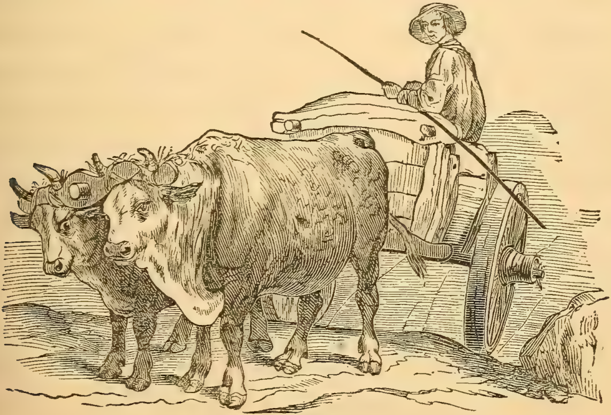
In this view, no grade animals, and no animals destitute of fixed peculiarities or characteristics which they share in common with all other animals of the class of which they are a type, and which they are capable of transmitting with certainty to their descendants, can be recognized by breeders as belonging to any one distinct race, breed, or family.

The term "native" is applied to a vast majority of our American cattle, which, though born on the soil, and thus in one sense natives, do not constitute a breed, race, or family, as correctly understood by breeders. They do not possess characteristics peculiar to them all, which they transmit with any certainty to their offspring, either of form, size, color, milking or working properties.

But, though an animal may be made up of a mixture of blood almost to impurity, it does not follow that, for specific purposes, it may not, as an individual animal, be one of the best of the species. Indeed, for particular purposes, animals might be selected from among those commonly called "natives" in New England, and "scrubs" at the west and south, equal, and perhaps superior, to any among the races produced by the most skillful breeding.

There can be no objection, therefore, to the use of the term "native," when it is understood as descriptive of no known breed, but only as applied to the common stock of a country, which does not constitute a breed. But perhaps the entire class of animals commonly called "natives" would be more accurately described as grades; since they are well known to have sprung from a great variety of cattle procured at different times and in different places on the continent of Europe, in England, and in the Spanish West Indies, brought together without any regard to fixed principles of breeding, but only from individual convenience, and by accident.

The first importations to this country were doubtless those taken to Virginia previous to 1609, though the exact date of their arrival is not known. Several cows were carried there from the West Indies in 1610, and in the next year no less than one hundred arrived there from abroad.



DRAFT OXEN.

The earliest cattle imported into New England arrived in 1624. At the division of cattle which took place three years after, one or two are distinctly described as black, or black and white, others as brindle, showing that there was no uniformity of color. Soon after this, a large number of cattle were brought over from England for the settlers at Salem. These importations formed the original stock of Massachusetts.

In 1725, the first importation was made into New York from Holland by the Dutch West India Company, and the foundation was then laid for an exceedingly valuable race of animals, which subsequent importations from the same country, as well as from England, have greatly improved. The points and value of this race in its purity have been already adverted to under the head of the Dutch cattle.

In 1627, cattle were brought from Sweden to the settlements on the Delaware, by the Swedish West India Company. In 1631, 1632, and 1633, several importations were made into New Hampshire by Captain John Mason, who, with Gorges, had procured the patent of large tracts of land in the vicinity of the Piscataqua river, and who immediately formed settlements there. The object of Mason was to carry on the manufacture of potash. For this purpose he employed the Danes; and it was in his voyage to and from Denmark that he procured many Danish cattle and horses, which were subsequently scattered over that entire region, large numbers being driven to the vicinity of Boston and sold. These Danish cattle are described as large and coarse, of a yellow color; and it is supposed that they were procured by Mason as being best capable of enduring the severity of the climate and the hardships to which they would be subjected.

However this may have been, they very soon spread among the colonists of the Massachusetts Bay, and have undoubtedly left their marks on the stock of the New England and the Middle States, which exist to some extent even to the present day, mixed in with an infinite multitude of crosses with the Devons, the Dutch cattle already alluded to, the black cattle of Spain and Wales, and the long horn and the short horn—most of which crosses were accidental, or due to local circumstances or individual convenience. Many of these cattle, the descendants of such crosses, are of a very high order of merit; but to which particular cross this is due, it is impossible to say. They generally make hardy, strong, and docile oxen, easily broken to the yoke and quick to work, with a fair tendency to fatten when well fed; while the cows, though often ill-shaped, are sometimes remarkably good milkers, especially as regards the quantity which they give.

Indeed, it has been remarked by excellent judges of stock, that if they desired to select a dairy of cows for milk for sale, they would make their selection from cows commonly called native, in preference to pure-bred animals of any of the established breeds, and that they believed they should find such a dairy the most profitable.

In color, the natives, made up as already indicated, are exceedingly various. The old Denmarks, which to a considerable extent laid the foundation of the stock of Maine and New Hampshire, were light yellow. The Dutch of New York and the Middle States, were black and white; the Spanish and Welsh were generally black; the Devons, which are supposed to have laid the foundation of the stock of some of the States, were red. Crosses of the Denmark with the Spanish and Welsh naturally made a dark brindle; crosses of the Devon often made a lighter or yellowish brindle; while the more recent importations of Jerseys and short horns have generally produced a beautiful spotted progeny. The deep red has long been a favorite color in New England; but the prejudice in its favor is fast giving way to more variegated colors.

Among the earlier importations into this country were also several varieties of hornless cattle, which have been kept measurably distinct in some sections; or where they have been crossed with the common stock there has been a tendency to produce hornless grades. These are not unfrequently known as "buffalo cattle." They were, in many cases, supposed to belong to the Galloway breed; or, which is more likely, to the Suffolk dun, a variety of the Galloway, and a far better milking stock than the Galloways, from which it sprung. These polled, or hornless cattle vary in color and qualities, but they are usually very good milkers when well kept, and many of them fatten well, and attain good weight.

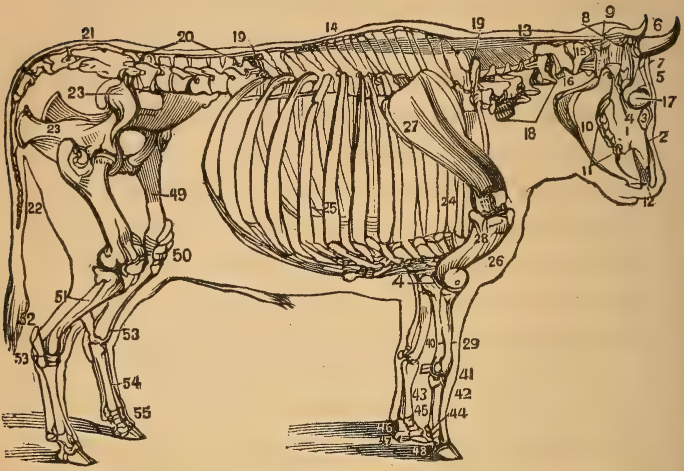
The Hungarian cattle have also been imported, to some extent, into different parts of the country, and have been crossed upon the natives with some success. Many other strains of blood from different breeds have also contributed to build up the common stock of the country of the present day; and there can be no question that its appearance and value have been largely improved during the last quarter of a century, nor that improvements are still in progress which will lead to satisfactory results in the future.

But, though we already have an exceedingly valuable foundation for improvement, no one will pretend to deny that our cattle, as a whole, are susceptible of it in many respects. They possess neither the size, the symmetry, nor the early maturity of the short horns; they do not, as a general thing, possess the fineness of bone, the beauty of form and color, nor the activity of the Devons or the Herefords; they do not possess that uniform richness of milk, united with generous quality, of the Ayrshires, nor the surpassing richness of milk of the Jerseys: but, above all, they do not possess the power of transmitting the many good qualities which they often have to their offspring—which is the characteristic of all well established breeds.

It is equally certain, in the opinion of many good judges, that the dairy stock of the country has not been materially improved in its intrinsic good qualities during the last thirty or forty years. This may not be true of certain sections, where the dairy has been made a special object of pursuit, and where the custom of raising the best male calves of the neighborhood, or those that came from the best dairy cows, and then of using only the best formed bulls, has long prevailed. Although in this way some progress has, doubtless, been made, there are still room and need for more. More attention must be paid to correct principles of breeding before the satisfactory results which every farmer should strive to reach can be attained.

Having glanced generally at the leading breeds of cattle in Great Britain, and examined, more in detail, the various breeds in the United States, the next subject demanding attention is,

THE NATURAL HISTORY OF CATTLE.



SKELETON OF THE OX AS COVERED BY THE MUSCLES.

1. The upper jaw-bone. 2. The nasal bone, or bone of the nose. 3. The lachrymal bone. 4. The malar, or cheek bone. 5. The frontal bone, or bone of the forehead. 6. The horns, being processes or continuations of the frontal. 7. The temporal bone. 8. The parietal bone, low in the temporal fossa. 9. The occipital bone, deeply depressed below the crest or ridge of the head. 10. The lower jaw. 11. The grinders. 12. The nippers, found on the lower jaw alone. 13. The ligament of the neck, and its attachments. 14. The atlas. 16. The dentata. 17. The orbits of the eye. 18. The vertebræ, or bones of the neck. 19. The bones of the back. 20. The bones of the loins. 21. The sacrum. 22. The bones of the tail. 23. The haunch and pelvis. 24. The eight true ribs. 25. The false ribs, with their cartilages. 26. The sternum. 27. The scapula, or shoulder-blade. 28. The humerus, or lower bone of the shoulder. 29. The radius, or principal bone of the arm. 40. The ulna, its upper part forming the elbow. 41. The small bones of the knee. 42. The large metacarpal or shank bone. 43. The smaller or splint bone. 44. The sessamoid bones. 45. The bifurcation at the pasterns, and the two larger pasterns to each foot. 46. The two smaller pasterns to each foot. 47. The two coffin bones to each foot. 48. The navicular bones. 49. The thigh bone. 50. The patella, or bone of the knee. 51. The tibia, or proper leg bone. 52. The point of the hock. 53. The small bones of the hock. 54. The metatarsals, or larger bones of the hind leg. 55. The pasterns and feet.

DIVISION. *Vertebrata*—possessing a back-bone.

CLASS. *Mammalia*—such as give suck.

ORDER. *Ruminantia*—chewing the cud.

FAMILY. With horns.

GENUS. *Bovidæ*—the ox tribe.

Of this tribe there are eight species:

Bos urus, the ancient bison.
Bos bison, the American buffalo.
Bos moschatus, the musk ox.
Bos frontalis, the gayal.
Bos grunniens, the grunting ox.
Bos caffer, the South African buffalo.
Bos bubalus, the common buffalo.
Bos taurus, the common domestic ox.

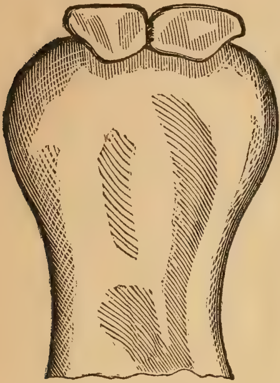
GESTATION.

The usual period of pregnancy in a cow is nine calendar months, and something over: at times as much as three weeks. With one thousand and thirty one cows, whose gestations were carefully observed in France, the average period was about two hundred and eighty-five days.

FORMATION OF TEETH.

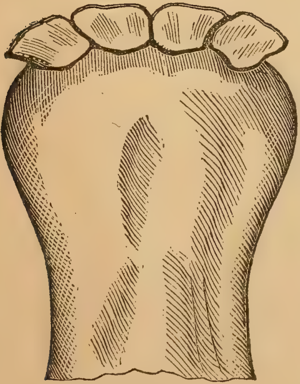
It is of the utmost importance to be able to judge of the age of a cow. Few farmers wish to purchase a cow for the dairy after she has passed her prime, which will ordinarily be at the age of nine or ten years, varying, of course, according to care, feeding, &c., in the earlier part of her life.

The common method of forming an estimate of the age of cattle is by an examination of the horn. At three years old, as a general rule, the horns are perfectly smooth; after this, a ring appears near the nob, and annually afterward a new one is formed, so that, by adding two years to the first ring, the age is calculated. This is a very uncertain mode of judging. The rings are distinct only in the cow; and it is well known that if a heifer goes to bull when she is two years old, or a little before or after that time, a change takes place in the horn and the first ring appears; so that a real three-year-old would carry the mark of a four-year-old.



TEETH AT BIRTH.

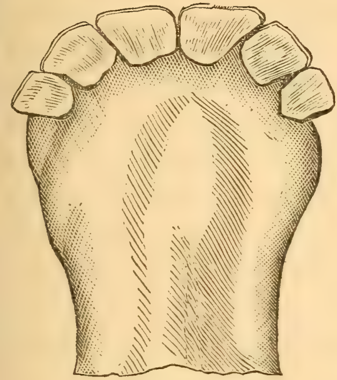
The rings on the horns of a bull are either not seen until five, or they cannot be traced at all; while in the ox they do not appear till he is five years old, and then are often very indistinct. In addition to this, it is by no means an uncommon practice to file the horns, so as to make them smooth, and to give the animal the appearance of being much younger than it really is. This is, therefore, an exceedingly fallacious guide, and cannot be relied upon by any one with the degree of confidence desired.

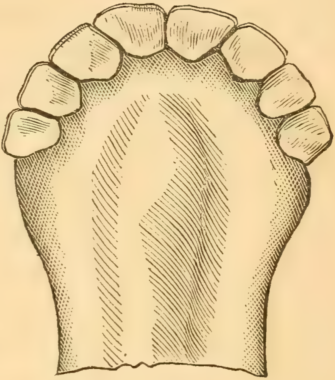


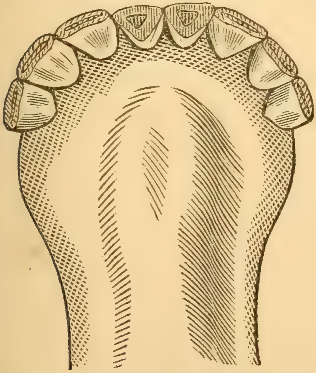
SECOND WEEK.

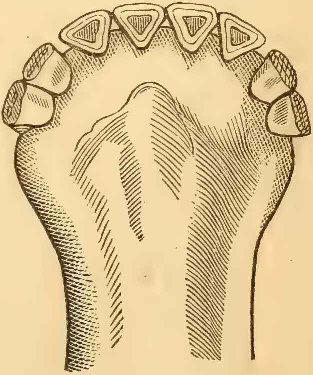
The surest indication of the age in cattle, as in the horse, is given by the teeth.

The calf, at birth, will usually have two incisor or front teeth—in some cases just appearing through the gums; in others, fully set, varying as the cow falls short of, or exceeds, her regular time of calving. If she overruns several days, the teeth will have set and attained considerable size, as appears in the cut representing teeth at birth. During the second week, a tooth will usually be added on each side, and the mouth will generally appear as in the next cut; and before the end of the third week, the animal will generally have six incisor teeth, as denoted in the cut representing

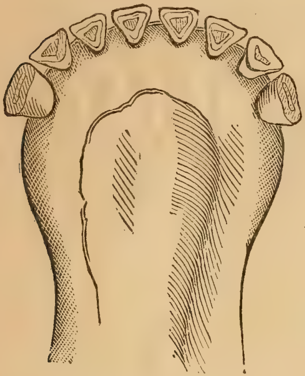

THREE WEEKS.


MONTH.


FIVE TO EIGHT MONTHS.

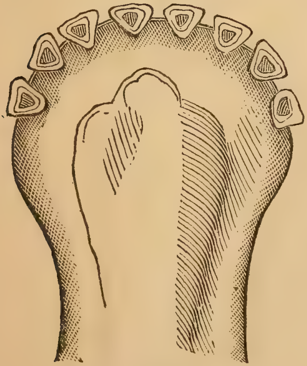

TEN MONTHS.

teeth at the third week; and in a week from that time the full number of incisors will have appeared, as seen in the next cut.



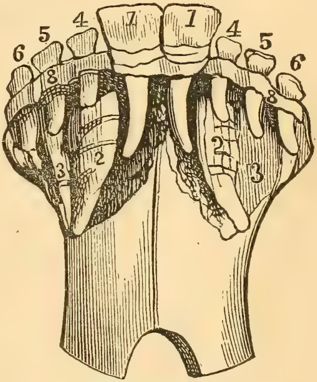
TWELVE MONTHS.

These teeth are temporary, and are often called milk-teeth. Their edge is very sharp; and as the animal begins to live upon more solid food, this edge becomes worn, showing the bony part of the tooth beneath, and indicates with considerable precision the length of time they have been used. The centre, or oldest teeth show the marks of age first, and often become somewhat worn before the corner teeth appear. At eight weeks, the four inner teeth are nearly as sharp as before. They appear worn not so much on the outer edge or line of the tooth, as inside this line; but, after this, the edge begins gradually to lose its sharpness, and to present a more flattened surface; while the next outer teeth wear down like the four central ones; and at three months this wearing off is very apparent, till at four months all the incisor teeth appear worn, but the inner ones the most. Now the teeth begin slowly to diminish in size by a



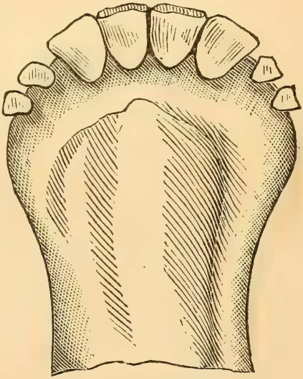
FIFTEEN MONTHS.

kind of contraction, as well as wearing down, and the distance apart becomes more and more apparent.



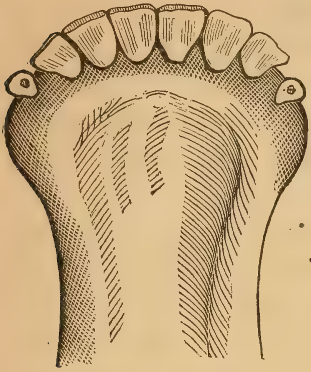
EIGHTEEN MONTHS.

From the fifth to the eighth month, the inner teeth will usually appear as in the cut of the teeth at that time; and at ten months, this change shows more clearly, as represented in the next cut, and the spaces between them begin to show very plainly, till at a year old they ordinarily present the appearance of the following cut; and at the age of fifteen months, that shown in the next, where the corner teeth are not more than half the original size, and the centre ones still smaller.

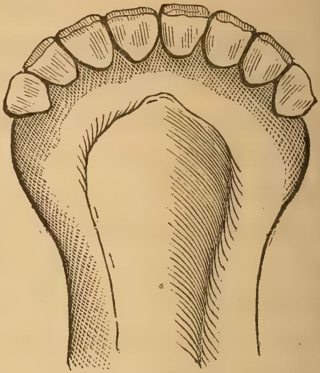


TWO YEARS PAST.

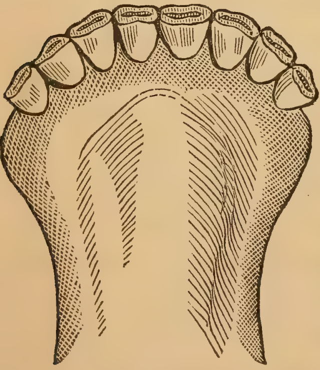
The permanent teeth are now rapidly growing, and preparing to take the place of the milk-teeth, which are gradually absorbed till they disappear, or are pushed out to give place to the two permanent central incisors, which at a year and a half will generally present the appearance indicated in the cut, which shows the internal structure of the lower jaw at this time, with the cells of the teeth, the two central ones protruding into the mouth, the next two pushing up, but not quite grown to the surface, with the third pair just perceptible. These changes require time; and at two years past the jaw will usually appear as in the cut, where four of the permanent central incisors are seen. After this, the other milk-teeth decrease rapidly, but are slow to disappear; and at three years old, the third pair of permanent teeth are but formed, as represented in the cut; and at four years the last pair of incisors will be up, as in the cut of that age; but the outside ones are not yet fully



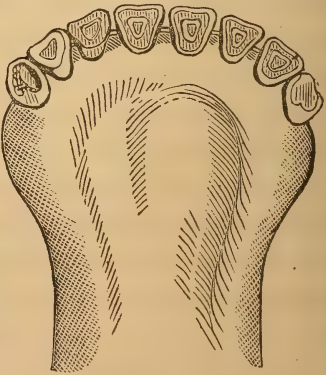
THREE YEARS PAST.



FOUR YEARS PAST.



FIVE YEARS PAST.



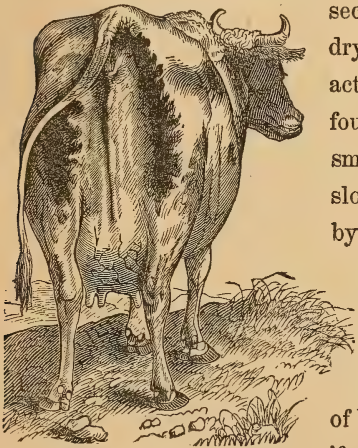
TEN YEARS PAST.

grown, and the beast can hardly be said to be full-mouthed till the age of five years. But before this age, or at the age of four years, the two inner pairs of permanent teeth are beginning to wear at the edges, as shown in the cut; while at five years old the whole set becomes somewhat worn down at the top, and on the two centre ones a darker line appears in the middle, along a line of harder bone, as appears in the appropriate cut.

Now will come a year or two, and sometimes three, when the teeth do not so clearly indicate the exact age, and the judgment must be guided by the extent to which the dark middle lines are worn. This will depend somewhat upon the exposure and feeding of the animal; but at seven years these lines extend over all the teeth. At eight years, another change begins, which cannot be mistaken. A kind of absorption begins with the two central incisors—slow at first, but perceptible—and these two teeth become smaller than the rest, while the dark lines are worn into one in all but the corner teeth, till, at ten years, four of the central incisors have become smaller in size, with a smaller and fainter mark, as indicated in the proper cut. At eleven, the six inner teeth are smaller than the corner ones; and at twelve, all become smaller than they were, while the dark lines are nearly gone, except in the corner teeth, and the inner edge is worn to the gum.

POINTS OF A GOOD COW.

After satisfaction is afforded touching the age of a cow, she should be examined with reference to her soundness of constitution. A good constitution is indicated by large lungs, which are found in a deep, broad, and prominent chest, broad and well-spread ribs, a respiration somewhat slow and regular, a good appetite, and if in milk a strong inclination to drink, which a large secretion of milk almost invariably stimulates. In such a cow the digestive organs are active and energetic, and they make an abundance of good blood, which in turn stimulates the activity of the nervous system, and furnishes the milky glands with the means of abundant secretion. Such a cow, when dry, readily takes on fat. When activity of the milk-glands is found united with close ribs, small and feeble lungs, and a slow appetite, often attended by great thirst, the cow will generally possess only a weak and feeble constitution; and if the milk is plentiful, it will generally be of bad quality, while the animal, if she does not die of diseased lungs, will not readily take on fat, when dry and fed.


A GOOD MILCH COW.

In order to have no superfluous flesh, the cow should have a small, clean, and rather long head, tapering toward the muzzle. A cow with a large, coarse head will seldom fatten readily, or give a large quantity of milk. A coarse head increases the proportion of weight of the least valuable parts, while it is a sure indication that the whole bony structure is too heavy. The mouth should be large and broad; the eye bright and sparkling, but of a peculiar placidness of expression, with no indication of wildness, but rather a mild and feminine look. These points will indicate gentleness of disposition. Such cows seem to like to be milked, are fond of being caressed, and often return caresses. The horns should be small, short, tapering, yellowish, and glistening. The neck should be small, thin, and tapering toward the head, but thickening when it approaches the shoulder; the dewlaps small. The fore quarters should be rather small when compared with the hind quarters. The form of the barrel will be large, and each rib should project further than the preceding one, up to the loins. She should be well formed across the hips and in the rump.

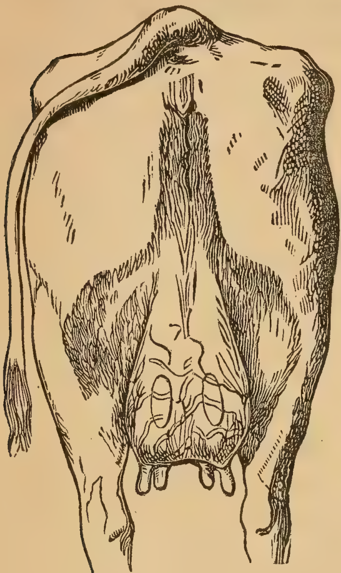
The spine or backbone should be straight and long, rather loosely hung, or open along the middle part, the result of the distance between the dorsal vertebræ, which sometimes causes a slight depression, or sway back. By some good judges, this mark is regarded as of great importance, especially when the bones of the hind quarters are also rather loosely put together, leaving the rump of great width and the pelvis large, and the organs and milk-vessels lodged in the cavities largely developed. The skin over the rump should be loose and flexible. This point is of great importance; and as, when the cow is in low condition or very poor, it will appear somewhat harder and closer than it otherwise would, some practice and close observation are required to judge well of this mark. The skin, indeed, all over the body, should be soft and mellow to the touch, with soft and glossy hair. The tail, if thick at the setting on, should taper and be fine below.

But the udder is of special importance. It should be large in proportion to the size of the animal, and the skin thin, with soft, loose folds extending well back, capable of great distension when filled, but shrinking to a small compass when entirely empty. It must be free from lumps in every part, and provided with four teats set well apart, and of medium size. Nor is it less important to observe the milk-veins carefully. The principal ones under the belly should be large and prominent, and extend forward to the navel, losing themselves, apparently, in the very best milkers, in a large cavity in the flesh, into which the end of the finger can be inserted; but when the cow is not in full milk, the milk-vein, at other times very prominent, is not so distinctly traced; and hence, to judge of its size when the cow is dry, or nearly so, this vein may be pressed near its end, or at its entrance into the body, when it will immediately fill up to its full size. This vein does not convey the milk to the udder, as some suppose, but is the channel by which the blood returns; and its contents consist of the refuse of the secretion, or of what has not been taken up in forming milk. There are also veins in the udder, and the perineum, or the space above the udder, and between that and the buttocks, which it is of special importance to observe. These veins should be largely developed, and irregular or knotted, especially those of the udder. They are largest in great milkers.

The knotted veins of the perineum, extending from above downwards in a winding line, are not readily seen in young heifers, and are very difficult to find in poor cows, or those of only a medium quality. They are easily found in very good milkers, and if not at first apparent, they are made so by pressing upon them at the base of the perineum, when they swell up and send the blood back toward the vulva. They form a kind of thick network under the skin of the perineum, raising it up somewhat, in some cases near the vulva, in others nearer down and closer to the udder. It is important to look for these veins, as they often form a very important guide, and by some they would be considered as furnishing the surest indications of the milking qualities of the cow. Full development almost always shows an abundant secretion of milk; but they are far better developed after the cow has had two or three calves, when two or three years' milking has given full activity to the milky glands, and attracted a large flow of blood. The larger and more prominent these veins the better. It is needless to say that in observing them some regard should be had to the condition of the cow, the thickness of skin and fat by which they may be surrounded, and the general activity and food of the animal. Food calculated to stimulate the greatest flow of milk will naturally increase these veins, and give them more than usual prominence.

THE MILK-MIRROR.

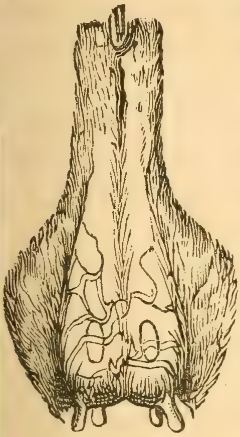
The discovery of M. Guénon, of Bordeaux, in France—a man of remarkable practical sagacity, and a close observer of stock—consisted in the connection between the milking qualities of the cow and certain external marks on the udder, and on the space above it, called the perineum, extending to the buttocks. To these marks he gave the name of milk-mirror, or escutcheon, which consists in certain perceptible spots rising up from the udder in different directions, forms and sizes, on which the hair grows upward, whilst the hair on other parts of the body grows downward. The reduction of these marks into a system, explaining the value of particular forms and sizes of the milk-mirror, belongs exclusively to Guénon.

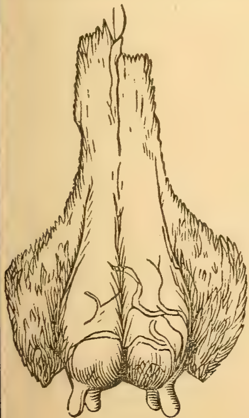


MILK-MIRROR [A.

He divided the milk-mirror into eight classes, and each class into eight orders, making in all no less than sixty-four divisions, which he afterward increased by subdivisions, thus rendering the whole system complicated in the extreme, especially as he professed to be able to judge with accuracy, by means of the milk-mirror, not only of the exact quantity a cow would give, but also of the quality of the milk, and of the length of time it would continue. He endeavored to prove too much, and was, as a matter of consequence, frequently at fault himself.

Despite the strictures which have been passed upon Guénon's method of judging of cows, the best breeders and judges of stock concur in the opinion, as the result of their observations, that cows with the most perfectly developed milk-mirrors are, with rare exception, the best milkers of their breed; and that cows with small and slightly developed milk-mirrors are, in the majority of cases, bad milkers. There are, undoubtedly, cows with very small mirrors, which are, nevertheless, very fair in the yield of milk; and among those with middling quality of mirrors, instances of rather more than ordinary milkers often occur, while at the same time it is true that cases now and then are found where the very best marked and developed mirrors are found on very poor milkers. These apparent exceptions, however, are to be explained, in the large majority of cases, by causes outside of those which affect the appearance of the milk-mirror. It is, of course, impossible to estimate with mathematical accuracy either the quantity, quality, or duration of the milk, since it is affected by so many chance circumstances, which cannot always be known or estimated by even the most skillful judges; such, for example, as the food, the treatment, the temperament, accidental diseases, inflammation of the udder, premature calving, the climate and season, the manner in which she has been milked, and a thousand other things which interrupt or influence the flow of milk, without materially changing the size or shape of the milk-mirror. It has, indeed, been very justly observed that we often see cows equally well formed, with precisely the same milk-

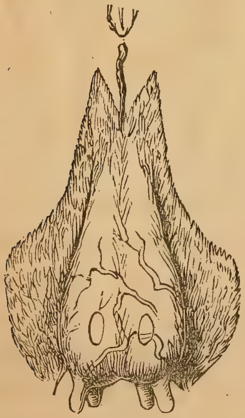

MILK-MIRROR [B.]


MILK-MIRROR [C.]

mirror, and kept in the same circumstances, yet giving neither equal quantities nor similar qualities of milk. Nor could it be otherwise; since the action of the organs depends, not merely on their size and form, but, to a great extent, on the general condition of each individual.

The different forms of milk-mirrors are represented by the shaded parts of cuts, lettered A, B, C, D; but it is necessary to premise that upon the cows themselves they are always partly concealed by the thighs, the udder, and the folds of the skin, which are not shown, and therefore they are not always so uniform in nature as they appear in the cuts.

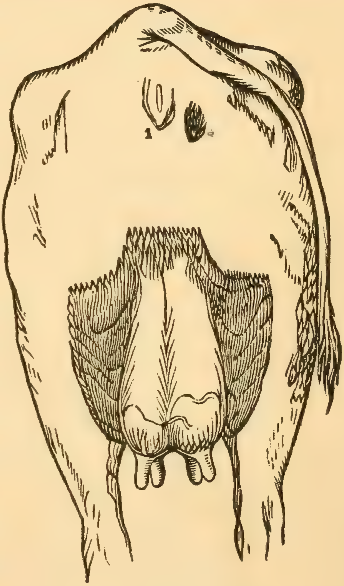
Their size varies as the skin is more or less folded or stretched; while the cuts represent the skin as uniform or free from folds, but not stretched out. It is usually very easy to distinguish the milk-mirrors by the upward direction of the hair which forms them. They are sometimes marked by a line of bristly hair growing in the opposite direction, which surrounds them, forming a sort of outline by the upward and downward growing hair. Yet, when the hair is very fine and short, mixed with longer hairs, and the skin much folded, and the udder voluminous and pressed by the thighs, it is necessary, in order to distinguish the part enclosed between the udder and the legs, and examine the full size of the mirrors, to observe them attentively, and to place the legs wide apart, and to smooth out the skin, in order to avoid the folds.



MILK-MIRROR [D.]

The mirrors may also be observed by holding the back of the hand against the perineum, and drawing it from above downward, when the nails rubbing against the up-growing hair, make the parts covered by it very perceptible.

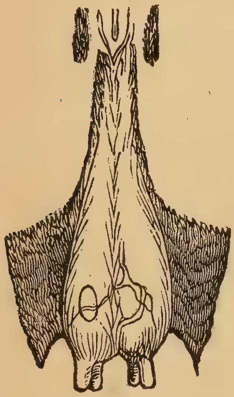
As the hair of the milk-mirror has not the same direction as the hair which surrounds it, it may often be distinguished by a difference in the shade reflected by it. It is then sufficient to place it properly to the light in order to see the difference in shade, and to make out the part covered by the upward-growing hair. Most frequently, however, the hair of the milk-mirror is thin and fine, and the color of the skin can easily be seen. If the eye alone is trusted, we shall often be deceived.



MILK-MIRROR [E.]

In some countries cattle-dealers shave the back part of the cow. Just after this operation the mirrors can neither be seen nor felt; but this inconvenience ceases in a few days. It may be added that the shaving—designed, as the dealers say, to beautify the cow—is generally intended simply to destroy the milk-mirror, and to deprive buyers of one means of judging of the milking qualities of the cows. It is unnecessary to add that the cows most carefully shaven are those which are badly marked, and that it is prudent to take it for granted that cows so shorn are bad milkers.

Milk-mirrors vary in position, extent, and the figure which they represent. They may be divided according to their position, into mirrors or escutcheons, properly so called, or into lower and upper tufts, or escutcheons. The latter are very small in comparison with the former, and are situated in close proximity to the vulva, as seen at 1, in cut E. They are very common on cows of bad milking races, but are very rarely seen on the best milch cows. They consist of one or two ovals, or small bands of up-growing hair, and serve to indicate the continuance of the flow of milk. The period is short, in proportion as the tufts are large. They must not be confounded with the escutcheon proper, which is often extended up to the vulva. They are separated from it by bands of hair, more or less large, as in cut marked F.


MILK-MIRROR [F.]

Milk-mirrors are sometimes symmetrical, and sometimes without symmetry. When there is a great difference in the extent of the two halves, it almost always happens that the teats on the side where the mirror is best developed give more milk than those of the opposite side. The left half of the mirror, it may be remarked, is almost always the largest; and so, when the perinean part is folded into a square, it is on this side of the body that it unfolds. Of three thousand cows in

Denmark, but a single one was found, whose escutcheon varied even a little from this rule.

The mirrors having a value in proportion to the space which they occupy, it is of great importance to attend to all the rows of down-growing hairs, which diminish the extent of surface, whether these tufts are in the midst of the mirror, or form indentations on its edges.

These indentations, concealed in part by the folds of the skin, are sometimes seen with difficulty; but it is important to take them into account, since in a great many cows they materially lessen the size of the mirror. Cows are often found, whose milk-mirrors at first sight appear very large, but which are only medium milkers; and it will usually be found that lateral indentations greatly diminish the surface of up-growing hair. Many errors are committed in estimating the value of such cows, from a want of attention to the real extent of the mirror.

All the interruptions in the surface of the mirror indicate a diminution in the quantity of the milk, with the exception, however, of small oval or elliptical plates which are found in the mirror, on the back part of the udders of the best cows, as represented in the cut already given, marked A. These ovals have a peculiar tint, which is occasioned by the downward direction of the hair which forms them. In the best cows these ovals exist with the lower mirrors very well developed, as represented in the cut just named.

In short, it should be stated that, in order to determine the extent and significance of a mirror, it is necessary to consider the state of the perineum as to fat, and that of the fullness of the udder. In a fat cow, with an inflated udder, the mirror would appear larger than it really is; whilst in a lean cow, with a loose and wrinkled udder, it appears smaller. Fat will cover faults—a fact to be borne in mind when selecting a cow.

In bulls, the mirrors present the same peculiarities as in cows; but they are less varied in their form, and especially much less in size.

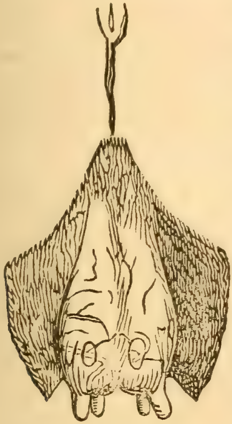
In calves, the mirrors show the shapes which they are afterwards to have, only they are more contracted, because the parts which they cover are but slightly developed. They are easily seen after birth; but the hair which then covers them is long, coarse, and stiff; and when this hair falls off, the calf's mirror will resemble that of the cow, but will be of less size.

With calves, however, it should be stated, in addition, that the milk-mirrors are more distinctly recognized on those from cows that are well kept, and that they will generally be fully developed at two years old. Some changes take place in the course of years, but the outlines of the mirror appear prominent at the time of advanced pregnancy, or, in the case of cows giving milk, at the times when the udder is more distended with milk than at others.

M. Mayne, who has explained and simplified the method of M. Guénon, divides cows, according to the quantity which they give, into four classes: first, the very good; second, the good; third, the medium; and fourth, the bad.

In the FIRST class he places cows, both parts of whose milk mirror, the mammary—the tuft situated on the udder, the legs and the thighs—and the perinean—that on the perineum, extending sometimes more or less out upon the thighs—are large, continuous, and uniform, covering at least a great part of the perineum, the udder, the inner surface of the thighs, and extending more or less out upon the legs, as in cut A, with no interruptions, or, if any, small ones, oval in form, and situated on the posterior face of the udder.

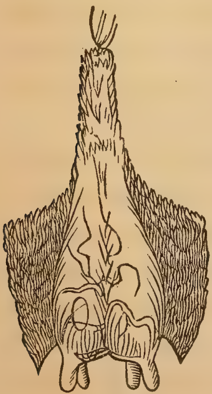
Such mirrors are found on most very good cows, but may also be found on cows which can scarcely be called good, and which should be ranked in the next class. But cows, whether having very well developed mirrors or not, may be reckoned as very good, and as giving as much milk as is to be expected from their size, food, and the hygienic circumstances in which they are kept, if they present the following characteristics: veins of the perineum large, as if swollen, and visible on the exterior—as in cut A—or which can easily be made to appear by pressing upon the base of the perineum; veins of the udder large and knotted; milk-veins large, often double, equal on both sides, and forming zig-zags, under the belly.


MILK-MIRROR [G].

To the signs furnished by the veins and by the mirror, may be added also the following marks: a uniform, very large, and yielding udder, shrinking much in milking, and covered with soft skin and fine hair; good constitution, full chest, regular appetite, and great propensity to drink. Such cows rather incline to be poor than to be fat. The skin is soft and yielding; short, fine hair; small head; fine horns; bright, sparkling eye; mild expression; feminine look; with a fine neck.

Cows of this first class are very rare. They give, even when small in size, from ten to fourteen quarts of milk a day; and the largest sized from eighteen to twenty-six quarts a day, and even more. Just after calving, if arrived at maturity and fed with good, wholesome, moist food in sufficient quantity and quality, adapted to promote the secretion of milk, they can give about a pint of milk for every ten ounces of hay, or its equivalent, which they eat.

They continue in milk for a long period. The best never go dry, and may be milked even up to the time of calving, giving from eight to ten quarts of milk a day. But even the best cows often fall short of the quantity of milk which they are able to give, from being fed on food which is too dry, or not sufficiently varied, or not rich enough in nutritive qualities, or deficient in quantity.



MILK-MIRROR [H.]

The SECOND class is that of *good cows;* and to this belong the best commonly found in the market and among the cow-feeders of cities.

They have the mammary part of the milk-mirror well developed, but the perinean part contracted, or wholly wanting, as in cut G; or both parts of the mirror are moderately developed, or slightly indented, as in cut H. Cut E belongs also to this class, in the lower part; but it indicates a cow, which—as the upper mirror, 1, indicates—dries up sooner when again in calf.

These marks, though often seen in many good cows, should be considered as certain only when the veins of the perineum form, under the skin, a kind of network, which, without being very apparent, may be felt by a pressure on them; when the milk-veins on the belly are well-developed, though less knotty and less prominent than in cows of the first class; in short, when the udder is well developed, and presents veins which are sufficiently numerous, though not very large.

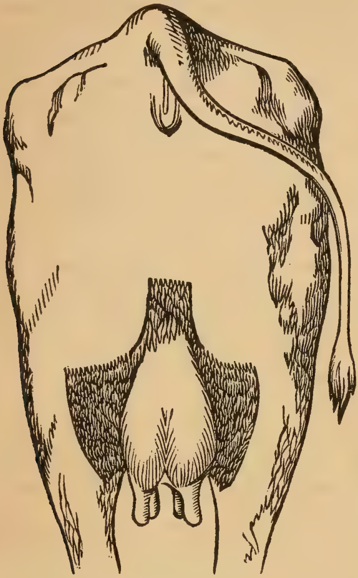
It is necessary here, as in the preceding class, to distrust cows in which the mirror is not accompanied by large veins. This remark applies especially to cows which have had several calves, and are in full milk. They are medium or bad, let the milk-mirror be what it may, if the veins of the belly are not large, and those of the udder apparent.

The general characteristics which depend on form and constitution combine, less than in cows of the preceding class, the marks of good health and excellent constitution with those of a gentle and feminine look.

Small cows of this class give from seven to ten or eleven quarts of milk a day, and the largest from thirteen to seventeen quarts. They can be made to give three-fourths of a pint of milk, just after calving, for every ten ounces of hay consumed, if well cared for, and fed in a manner favorable to the secretion of milk.

They hold out long in milk, when they have no upper mirrors or tufts. At seven or eight months in calf, they may give from five to eight quarts of milk a day.

The THIRD class consists of *middling cows*. When the milk-mirror really presents only the mammary or lower part slightly indicated or developed, and the perinean part contracted, narrow, and irregular—as in cut K—the cows are middling. The udder is slightly developed or hard, and shrinks very little after milking. The veins of the perineum are not apparent, and those which run along the lower side of the abdomen are small, straight, and sometimes unequal. In this case the mirror is not symmetrical, and the cow gives more milk on the side where the vein is the largest.



MILK-MIRROR [K.]

These cows have large heads, and a thick, hard skin. Being ordinarily in good condition, they are beautiful to look at, and seem to be well formed. Many of them are nervous and restive, and not easily approached.

Cows of this class give, according to size, from three or four to ten quarts of milk. They very rarely give, even in the most favorable circumstances, half a pint of milk for every ten ounces of hay which they consume. The milk diminishes rapidly, and dries up wholly the fourth or fifth month in calf.

The FOURTH class is composed of *bad cows*. As they are commonly in good condition, these cows are often the most beautiful of the herd and in the markets. They have fleshy thighs, thick and hard skin, a large and coarse neck and head, and horns large at the base.

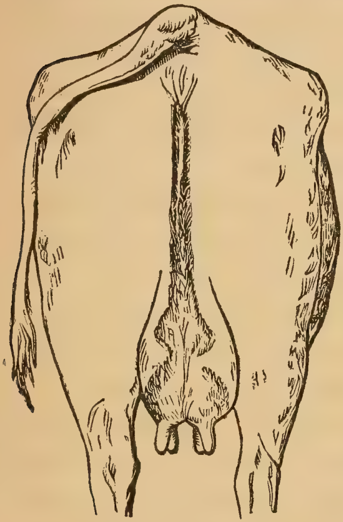
The udder is hard, small and fleshy, with a skin covered with long, rough hair. No veins are to be seen either on the perineum or the udder, while those of the belly are slightly developed, and the mirrors are ordinarily small, as in cut L.

With these characteristics, cows give only a few quarts of milk a day, and dry up in a short time after calving. Some of them can scarcely nourish their calves, even when they are properly cared for and well fed.

Sickly habits, chronic affections of the digestive organs, the chest, the womb, and the lacteal system, sometimes greatly affect the milk secretion, and cause cows troubled with them to fall from the first or second to the third, and sometimes to the fourth class.

Without pushing this method of judging of the good milking qualities of cows into the objectionable extreme to which it was carried by its originator, it may be safely asserted that the milk-mirror forms an important additional mark or point for distinguishing good milkers; and it may be laid down as a rule that, in the selection of milch cows, as well as in the choice of young animals for breeders, the milk-mirror should, by all means, be examined and considered; but that we should not limit or confine ourselves exclusively to it, and that other and long-known marks should be equally regarded.

There are cases, however, where a knowledge and careful examination of the form and size of the mirror become of the highest importance. It is well known that certain signs or marks of great milkers are developed, only as the capacities of the animal herself are fully and completely developed by age. The milk-veins, for instance, are never so large and prominent in heifers and young cows as in old ones, and the same may be said of the udder, and of the veins of the udder and perineum; all of which it is of great importance to observe in the selection of milch cows. Those signs, then, which in cows arrived at maturity are almost sufficient in themselves to warrant a conclusion as to their merits as milkers, are, to a great extent, wanting in younger animals, and altogether in calves, as to which there is often doubt whether they shall be raised; and here a knowledge of the form of the mirror is of immense advantage, since it gives, at the outset and before any expense is incurred, a somewhat reliable means of judging of the future milking capacities of the animal; or, if a male, of the probability of his transmitting milking qualities to his offspring.

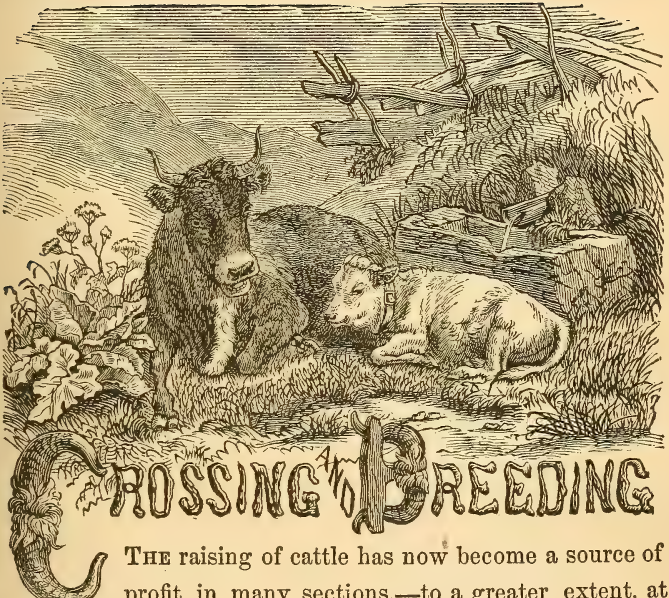


MILK-MIRROR [L.]

It will be seen, from an examination of the points of a good milch cow. that, though the same marks which indicate the greatest milking qualities may not always indicate the greatest aptitude to fatten, yet that the signs which denote good fattening qualities are included among the signs favorable to the production of milk; such as soundness of constitution, marked by good organs of digestion and respiration, fineness and mellowness of the skin and hair, quietness of disposition—which inclines the animal to rest and lie down while chewing the cud—and other marks which are relied on by graziers in selecting animals to fatten.

In buying dairy stock the farmer generally finds it for his interest to select young heifers, as they give the promise of longer usefulness. But it is often the case that older cows are selected with the design of using them for the dairy for a limited period, and then feeding them for the butcher. In either case, it is advisable, as a rule, to choose animals in low or medium condition. The farmer cannot commonly afford to buy fat; it is more properly his business to make it, and to have it to sell. Good and well-marked cows in poor condition will rapidly gain in flesh and products when removed to better pastures and higher keeping, and they cost less in the original purchase.

It is, perhaps, superfluous to add that regard should be had to the quality of the pasturage and keeping which a cow has previously had, as compared with that to which she is to be subjected. The size of the animal should also be considered with reference to the fertility of the pastures into which she is to be put. Small or medium-sized animals accommodate themselves to ordinary pastures far better than large ones. Where a very large cow will do well, two small ones will usually do better; while the large animal might fail entirely where two small ones would do well. It is better to have the whole herd, so far as may be, uniform in size; for, if they vary greatly, some may get more than they need, and others will not have enough. This, however, cannot always be brought about.



CROSSING AND BREEDING

THE raising of cattle has now become a source of profit in many sections,—to a greater extent, at least, than formerly—and it becomes a matter of great practical importance to our farmers to take the proper steps to improve them. Indeed, the questions—what are the best breeds, and what are the best crosses, and how shall I improve my stock—are now asked almost daily; and their practical solution would add many thousand dollars to the aggregate wealth of the farmers of the country, if they would all study their own interests.

The time is gradually passing away when the intelligent practical farmer will be willing to put his cows to any bull, simply because his services may be had for twenty-five cents; for, even if the progeny is to go to the butcher, the calf sired by a pure-bred bull—particularly of a race distinguished for fineness of bone, symmetry of form, and early maturity—will bring a much higher price at the same age than a calf sired by a scrub. Blood has a money value, which will, sooner or later, be generally appreciated.

The first and most important object of the farmer is to get the greatest return in money for his labor and his produce; and it is for his interest to obtain an animal—a calf, for example—that will yield the largest profit on the outlay. If a calf, for which the original outlay was five dollars, will bring at the same age and on the same keep more real net profit than another, the original outlay for which was not twenty-five cents, it is certainly for the farmer's interest to make the heavier original outlay and thus secure the superior animal. Setting all fancy aside, it is merely a question of dollars and cents; but one thing is certain—and that is, that no farmer can afford to keep poor stock. It eats as much, and requires nearly the same amount of care and attention, as stock of the best quality; while it is equally certain that stock of ever so good a quality, whether grade, native, or thoroughbred, will be sure to deteriorate and sink to the level of poor stock by neglect and want of proper attention.

How, then, is our stock to be improved? Not, certainly, by that indiscriminate crossing, with a total disregard of all well-established principles, which has thus far marked our efforts with foreign stock, and which is one prominent reason why so little improvement has been made in our dairies; nor by leaving all the results to chance, when, by a careful and judicious selection, they may be within our own control.

We want cattle for distinct purposes, as for milk, beef, or labor. In a large majority of cases—especially in the dairy districts, at least, comprising the Eastern and Middle States—the farmer cares more for the milking qualities of his cows, especially for the quantity they give, than for their fitness for grazing, or aptness to fatten. These latter points become more important in the Western and some of the Southern States, where much greater attention is paid to breeding and to feeding, and where comparatively slight attention is given to the productions of the dairy. A stock of cattle which would suit one farmer might be wholly unsuited to another; and in such particular case the breeder should have some special object in view, and select his animals with reference to it.

There are, however, some well-defined general principles that apply to breeding everywhere, and which, in many cases, are not thoroughly understood. To these attention will now be directed.

The first and most important of the laws to be considered in this connection is that of *similarity.* It is by virtue of this law that the peculiar characters, properties, and qualities of the parents—whether external or internal, good or bad, healthy or diseased—are transmitted to their offspring. This is one of the plainest and most certain of the laws of nature. The lesson which it teaches may be stated in five words:—Breed only from the best.

Judicious selection is indispensable to success in breeding, and this should have regard to every particular—general appearance, length of limb, shape of carcass, development of chest; in cattle, to the size, shape, and position of the udder, thickness of skin, touch, length and texture of hair, docility, and all those points which go to make up the desirable animal.

Not only should care be exercised to avoid *structural defects*, but especially to secure freedom from *hereditary diseases;* as both defects and diseases appear to be more easily transmissible than desirable qualities. There is, oftentimes, no obvious peculiarity of structure or appearance which suggests the possession of diseases or defects which are transmissible; and for this reason, special care and continued acquaintance are requisite in order to be assured of their absence in breeding animals; but such a tendency, although invisible or inappreciable to careless observers, must still, judging from its effects, have as real and certain an existence as any peculiarity of form or color.

In neat cattle, hereditary diseases do not usually show themselves at birth; and sometimes the tendency remains latent for many years, perhaps through one or two generations, and afterward breaks out with all its former severity. The diseases which are found hereditary in cattle are scrofula, consumption, dysentery, diarrhœa, rheumatism, and malignant tumors. As these animals are less exposed to the exciting causes of disease, and less liable to be overtasked or subjected to violent changes of temperature, or otherwise put in jeopardy, their diseases are not so numerous as those of the horse, and what they have are less violent, and generally of a chronic character.

With regard to hereditary diseases, it is eminently true that "an ounce of prevention is worth a pound of cure." As a general and almost invariable rule, animals possessing either defects or a tendency to disease, should not be employed for breeding. If, however, for special reasons it seems desirable to breed from one which has some slight defect of symmetry, or a faint tendency to disease—although for the latter it is doubtful whether the possession of any good qualities can fully compensate—it should be mated with one which excels in every respect in which it is itself deficient, and on no account with one which is near of kin to it.

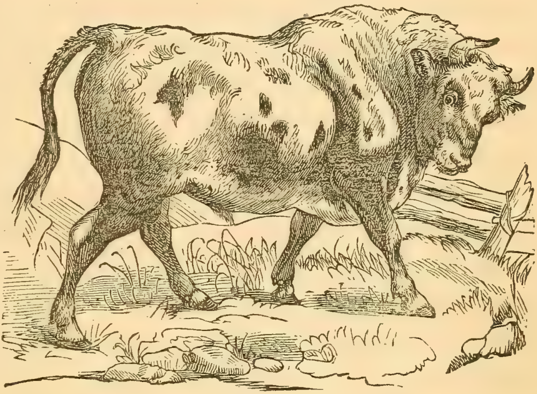
There is another law, by which that of similarity is greatly modified—the law of *Variation* or divergence.

All animals possess a certain flexibility or pliancy of organization, which renders them capable of change to a greater or less extent. When in a state of nature, variations are comparatively slow and infrequent; but when in a state of domestication they occur much oftener and to a much greater extent. The greater variability in the latter case is doubtless owing, in some measure, to our domestic productions' being reared under conditions of life not so uniform as, and different from, those to which the parent species was exposed in a state of nature.

Among what are usually reckoned the more active causes of variation may be named *climate*, *food*, and *habit*. Animals in a cold climate are provided with a thicker covering of hair than in warmer ones. Indeed, it is said that in some of the tropical provinces of South America, there are cattle which have an extremely rare and fine fur, in place of the ordinary pile of hair. The supply of food, whether abundant or scanty, is one of the most efficient causes of variation known to be within the control of man. A due consideration of the natural effects of climate and food is a point worthy the careful attention of the stock-husbandman. If the breeds employed be well adapted to the situation, and the capacity of the soil be such as to feed them fully, profit may be safely anticipated. Animals are to be regarded as machines for converting herbage into money.

The bestowal of food sufficient, both in amount and quality, to enable animals to develop all the excellencies inherent in them, and yield all the profit of which they are capable, is something quite distinct from undue forcing or pampering. The latter process may produce wonderful animals to look at, but neither useful nor profitable ones, and there is danger of thus producing a most undesirable variation, since in animals the process may be carried far enough to produce barrenness. Instances are not wanting, particularly among the more recent improved short-horns, of impotency among the males and of barrenness among the females; and in some cases where the latter have borne calves, they have failed to secrete sufficient milk for their nourishment. Impotency in bulls of various breeds has, in many instances, occurred from too high feeding, especially when connected with a lack of sufficient exercise. A working bull, though perhaps not so pleasing to the eye as a fat one, is a surer stock-getter; and his progeny is more likely to inherit full health and vigor.

Habit has a decided influence toward producing variations. We find in domestic animals that use—or the demand created by habit—is met by a development or change in the organization adapted to the requirement. For instance, with cows in a state of nature, or where required only to suckle their young, the supply of milk is barely fitted to the requirement. If more is desired, and the milk is drawn completely and regularly, the yield is increased and continued longer. By keeping up the demand there is induced, in the next generation, a greater development of the secreting organs, and more milk is given. By continuing the practice, by furnishing the needful conditions of suitable food and the like, and by selecting in each generation those animals showing the greatest tendency toward milk, a breed specially adapted for the dairy may be established. It is just by this mode that the Ayrshires have, within the past century, been brought to be what they are—a breed giving more good milk upon a certain amount of food than any other.



READY FOR ACTION.

It is a fact too well established to be controverted, that the first male produces impressions upon subsequent progeny by other males. To what extent this principle holds, it is impossible to say. Although the instances in which it is known to be of a very marked and obvious character may be comparatively few, yet there is ample reason to believe that, although in a majority of cases the effect may be less noticeable, it is not less real; and it therefore demands the special attention of breeders. The knowledge of this law furnishes a clue to the cause of many of the disappointments of which practical breeders often complain, and of many variations otherwise unaccountable, and it suggests particular caution as to the first male employed in the coupling of animals—a matter which has often been deemed of little consequence in regard to cattle, inasmuch as fewer heifers' first calves are reared, than those are which are borne subsequently.

The phenomenon—or law, as it is sometimes called—of atavism, or *ancestral influence,* is one of considerable practical importance, and well deserves the careful attention of the breeder of farm stock.

Every one is aware that it is by no means unusual for a child to resemble its grandfather, or grandmother, or even some ancestor still more remote, more than it does either its own father or mother. The same occurrence is found among our domestic animals, and oftener in proportion as the breeds are crossed or mixed up. Among our common stock of neat cattle, or natives—originating, as they did, from animals brought from England, Scotland, Denmark, France, and Spain, each possessing different characteristics of form, color, and use, and bred, as our common stock has usually been, indiscriminately together, with no special object in view, with no attempt to obtain any particular type or form, or to secure adaptation for any particular purpose—frequent opportunities are afforded of witnessing the results of this law of hereditary transmission. So common, indeed, is its occurrence, that the remark is often made, that, however good a cow may be, there is no telling beforehand what sort of a calf she may have. The fact is sufficiently obvious, that certain peculiarities often lie dormant for a generation or two and then reappear in subsequent progeny. Stockmen often speak of it as "breeding back," or "crying back."

The lesson taught by this law is very plain. It shows the importance of seeking thorough-bred or well-bred animals; and by these terms are simply meant such as are descended from a line of ancestors in which for many generations the desirable forms, qualities, and characteristics have been *uniformly shown.* In such a case, even if ancestral influence does come in play, no material difference appears in the offspring, the ancestors being all essentially alike. From this stand-point we best perceive in what consists the money value of a good "pedigree." This is valuable, in proportion as it shows an animal to be descended, not only from such as are purely of its own race or breed, but also from such individuals of that breed as were specially noted for the excellencies for which that particular breed is esteemed.

Probably the most distinctly marked evidence of ancestral influence among us, is to be found in the ill-begotten, round-headed calves, not infrequently dropped by cows of the common mixed kind, which, if killed early, make very blue veal, and if allowed to grow up, become exceedingly profitless and unsatisfactory beasts; the heifers being often barren, the cows poor milkers, the oxen dull, mulish beasts, yielding flesh of very dark color, of ill flavor and destitute of fat.

The relative influence of the male and female parents upon the characteristics of progeny has long been a fruitful subject of discussion among breeders. It is found in experience that progeny sometimes resembles one parent more than the other—sometimes there is an apparent blending of the characteristics of both—sometimes a noticeable dissimilarity to either, though always more or less resemblance somewhere—and sometimes the impress of one may be seen upon a portion of the organization of the offspring, and that of the other parent upon another portion; yet we are not authorized from such discrepancies to conclude that it is a matter of chance; for all of nature's operations are conducted in accordance with fixed laws, whether we be able fully to discover them or not. The same causes always produce the same results. In this case, not less than in others, there are, beyond all doubt, certain fixed laws; and the varying results which we see are easily and sufficiently accounted for by the existence of conditions or modifying influences not fully open to our observation.

It may be stated, on the whole—as a result of the varied investigations to which this question has given rise—that the evidence, both from observation and the testimony of the best practical breeders, goes to show that each parent usually contributes certain portions of the organization to the offspring, and that each has a modifying influence upon the other. Facts also show that the same parent does not always contribute the same portions, but that the order is at times, and not rarely, reversed. Where animals are of distinct species or breeds, transmission is usually found to be in harmony with the principle, that the male gives mostly the outward form and locomotive system, and the female chiefly the interior system, constitution and the like. Where the parents are of the same breed, it appears that the proportions contributed by each are governed, in a large measure, by the condition of each in regard to age and vigor, or by virtue of individual potency or superiority of physical endowment. This potency or power of transmission, seems to be legitimately connected with high breeding, or the concentration of fixed qualities, obtained by continued descent for many generations from such only as possess in the highest degree the qualities desired.

Practically, the knowledge obtained dictates in a most emphatic manner that every stock-grower use his utmost endeavor to obtain the services of the best sires; that is, the best for the ends and purposes in view—that he depend chiefly on the sire for outward form and symmetry—and that he select dams best calculated to develop the good qualities of the male, depending chiefly upon these for freedom from internal disease, for hardihood and constitution, and, generally, for all qualities dependent upon the vital or nutritive system. The neglect of the qualities of the dam, which is far too common—miserably old and inferior animals being often employed—cannot be too strongly censured.

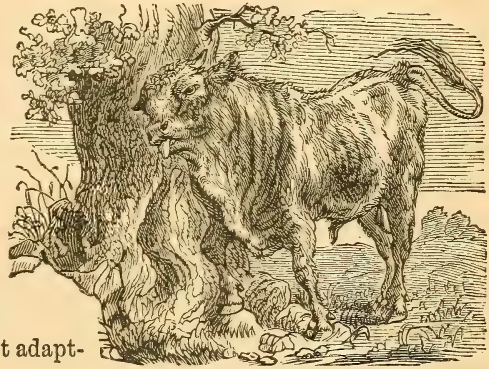
With regard to the laws which regulate the *sex* of the progeny very little is known. Many and extensive observations have been made, without reaching any definite conclusion. Nature seems to have provided that the number of each sex produced, shall be nearly equal; but by what means this result is attained, has not as yet been discovered.

It has long been a disputed point, whether the system of *breeding in-and-in*, or the opposite one of frequent crossing, has the greater tendency to improve the character of stock.

This term, in-and-in, is often very loosely used and as variously understood. Some confine the phrase to the coupling of those of exactly the same blood, as brothers and sisters, while others include in it breeding from parents and offsprings; and others still employ it to embrace those of a more distant relationship. For the last, the term breeding-in, or close breeding, is generally deemed more suitable.

The current opinion is decidedly against the practice of breeding from any near relatives; it being usually found that degeneracy follows, and often to a serious degree; but it is not proved that this degeneracy, although very common and even usual, is yet a necessary consequence. That ill effects follow, in a majority of cases, is not to be doubted; but this is easily and sufficiently accounted for upon quite other grounds. Perhaps, however, the following propositions may be safely stated: That in general practice, with the grades and mixed animals common in the country, *close-breeding should be scrupulously avoided* as highly detrimental. It is better *always* to avoid breeding from near relatives whenever stock-getters of the same breed and of equal merit can be obtained which are not related. Yet, where this is not possible, or where there is some desirable and clearly defined purpose in view—as the fixing and perpetuating of some valuable quality in a particular animal not common to the breed—and the breeder possesses the knowledge and skill needful to accomplish his purpose, and the animals are perfect in health and development, close breeding may be practised with advantage.

The practice of *crossing*, like that of close breeding, has its strong and its weak side. Judiciously practised, it offers a means of providing animals *for the butcher*, often superior to, and more profitable than, those of any pure breed. It is also admissible as the foundation of a systematic and well-considered attempt to establish a new breed. But when crossing is practised injudiciously and indiscriminately, and especially when so done for the purpose of procuring *breeding animals*, it is scarcely less objectionable than careless in-and-in breeding.



A SPRIGHTLY YOUTH.

The profitable style of breeding for the great majority of farmers to adopt, is neither to cross nor to breed from close affinities—except in rare instances, and for some specific and clearly understood purpose—but to *breed in the line*; that is, to select the breed or race best adapted to fulfil the requirement demanded, whether it be for the dairy, for labor, or for such combination of these as can be had without too great a sacrifice of the principal requisite, and then to procure a *pure-bred* male of the kind determined upon, and breed him to the females of the herd; and if these be not such as are calculated to develop his qualities, endeavor by purchase or exchange to procure such as will. Let the progeny of these be bred to another *pure-bred* male of the same breed, but as distantly related to the first as may be. Let this plan be faithfully pursued, and, although we cannot, without the intervention of well-bred females, procure stock purely of the kind desired, yet in several generations—if proper care be given to the selection of males, that each one be such as to retain and improve upon the points gained by his predecessor—the stock, for most practical purposes, will be as good as if thorough-bred. If this plan were generally adopted, and a system of letting or exchanging males established, the cost might be brought within the means of most persons, and the advantages which would accrue would be almost beyond belief.

A brief summing-up of the foregoing principles may not be inappropriate here.

The law of similarity teaches us to select animals for breeding which possess the desired forms and qualities in the greatest perfection and best combination.

Regard should be had, not only to the more obvious characteristics, but also to such hereditary traits and tendencies as may be hidden from cursory observation and demand careful and thorough investigation.

From the hereditary nature of all characteristics, whether good or bad, we learn the importance of having all desirable qualities *thoroughly inbred;* or, in other words, so firmly in each generation that the next is warrantably certain to present nothing worse—that no ill results follow from breeding back to some inferior ancestor—that all undesirable traits or points be, so far as possible, *bred-out.*

So important is this consideration, that, in practice, it is decidedly preferable to employ a male of ordinary external appearance—provided his ancestry be all which is desired—

rather than a grade, or cross-bred animal, although the latter be greatly his superior in personal beauty.

A knowledge of the law of variation teaches us to avoid, for breeding purposes, such animals as exhibit variations unfavorable to the purpose in view; to endeavor to perpetuate every real improvement gained; as well as to secure, as far as practicable, the conditions necessary to induce or continue any improvement, such as general treatment, food, climate, habits, and the like.

Where the parents do not possess the perfections desired, selections for coupling should be made with critical reference to correcting the faults or deficiencies of one by corresponding excellencies in the other.

To correct defects, too much must not be attempted at once. Pairing those very unlike oftener results in loss than gain. Avoid all extremes, and endeavor by moderate degrees to attain the end desired.

Crossing, between different breeds, for the purpose of obtaining animals for the shambles, may be advantageously practised to a considerable extent, but not for the production of breeding animals. As a general rule, cross-bred males should not be employed for propagation, and cross-bred females should be served by thorough-bred males.

In ordinary practice, breeding from near relatives is to be scrupulously avoided. For certain purposes, under certain conditions and circumstances, and in the hands of a skillful breeder, it may be practised with advantage—but not otherwise.

In a large majority of cases—other things being equal—we may expect in progeny the outward form and general structure of the sire, together with the internal qualities, constitution, and nutritive system of the dam; each, however, modified by the other.

Particular care should always be taken that the male by which the dam first becomes pregnant is the best which can be obtained; also, that at the time of sexual congress both are in vigorous health.

Breeding animals should not be allowed to become fat, but always kept in thrifty condition; and such as are intended for the butcher should never be fat but once.

In deciding with what breeds to stock a farm, endeavor to select those best adapted to its surface, climate, and degree of fertility; also, with reference to probable demand and proximity to markets.

No expense incurred in procuring choice animals for propagation, no amount of skill in breeding, can supersede, or compensate for, a lack of liberal feeding and good treatment. The better the stock, the better care they deserve.

PREGNANCY

The symptoms of pregnancy in its early stage were formerly deemed exceedingly unsatisfactory. The period of being in season—which commonly lasts three or four days, and then ceases for a while, and returns in about three weeks—might entirely pass over; and, although it was then probable that conception had taken place, yet in a great many instances the hopes of the breeder were disappointed. It was not until between the third and fourth month, when the belly began to enlarge—or, in many cases, considerably later—and when the motions of the fœtus might be seen, or, at all events, felt by pressing on the right flank, that the farmer could be assured that his cow was in calf.

That greatest of improvements in veterinary practice, the application of the ear to the chest and belly of various animals, in order to detect by the different sounds—which, after a short time, will be easily recognized—the state of the circulation through most of the organs, and consequently, the precise seat and degree of inflammation and danger, has now enabled the breeder to ascertain the existence of pregnancy at as early a stage as six or eight weeks. The beating of the heart of the calf may then be distinctly heard, twice, or more than twice, as frequent as that of the mother; and each pulsation will betray the singular double beating of the fœtal heart. This will also be accompanied by the audible rushing of the blood through the vessels of the placenta. The ear should be applied to the right flank, beginning on the higher part of it, and gradually shifting downward and backward. These sounds will thus soon be heard, and cannot be mistaken.

TREATMENT BEFORE CALVING.

Little alteration needs to be made in the management of the cow for the first seven months of pregnancy; except that, as she has not only to yield milk for the profit of the farmer, but to nourish the growing fœtus within, she should be well, yet not too luxuriantly, fed. The half-starved cow will not adequately discharge this double duty, nor provide sufficient nutriment for the calf when it has dropped; while the cow in high condition will be dangerously disposed to inflammation and fever, when, atthe time of parturition, she is otherwise so susceptible of the power of every stimulus. If the season and the convenience of the farmer will allow, she will be better at pasture, at least for some hours each day, than when confined altogether to the cow-house.

At a somewhat uncertain period before she calves, there will be a new secretion of milk for the expected little one; and under the notion of somewhat recruiting her strength, in order better to enable her to discharge her new duty—but more from the uniform testimony of experience that there is danger of local inflammation, general fever, garget in the udder, and puerperal fever, if the new milk descends while the old milk continues to flow—it has been usual to let the cow *go dry* for some period before parturition. Farmers and breeders have been strangely divided as to the length of this period. It must be decided by circumstances. A cow in good condition may be milked for a much longer period than a poor one. Her abundance of food renders a period of respite almost unnecessary; and all that needs to be taken care of, is that the old milk should be fairly gone before the new milk springs. In such a cow, while there is danger of inflammation from the sudden rush of new milk into a bag already occupied, there is almost always considerable danger of indurations and tumors in the teats from the habit of secretion being too long suspended. The emaciated and over-milked beast, however, must rest a while before she can again advantageously discharge the duties of a mother.

If the period of pregnancy were of equal length at all times and in all cows, the one that has been well fed might be milked until within a fortnight or three weeks of parturition, while a holiday of two months should be granted to the poorer beast; but as there is much irregularity about the time of gestation, it may be prudent to take a month or five weeks, as the average period.

The process of parturition is necessarily one that is accompanied with a great deal of febrile excitement; and, therefore, when it nearly approaches, not only should a little care be taken to lessen the quantity of food, and to remove that which is of a stimulating action, but a mild dose of physic, and a bleeding regulated by the condition of the animal, will be very proper precautionary measures.

A moderately open state of the bowels is necessary at the period of parturition in the cow. During the whole time of pregnancy her enormous stomach sufficiently presses upon and confines the womb; and that pressure may be productive of injurious and fatal consequences, if at this period the rumen is suffered to be distended by innutritious food, or the manyplus takes on that hardened state to which it is occasionally subject. Breeders have been sadly negligent in this respect.

The springing of the udder, or the rapid enlargement of it from the renewed secretion of milk—the enlargement of the external parts of the bearing (the former, as has been said by some, in old cows, and the latter in young ones)—the appearance of a glaring discharge from the bearing—the evident dropping of the belly, with the appearance of leanness and narrowness between the shape and the udder—a degree of uneasiness and fidgetiness—moaning occasionally—accelerated respiration—all these symptoms will announce that the time of calving is not far off. The cow should be brought near home, and put in some quiet, sheltered place. In cold or stormy weather she should be housed.

Her uneasiness will rapidly increase—she will be continually getting up and lying down—her tail will begin to be elevated and the commencement of the labor-pains will soon be evident.

In most cases the parturition will be natural and easy, and the less the cow is disturbed or meddled with, the better. She will do better without help than with it; but she should be watched, in order to see that no difficulty occurs which may require aid and attention. In cases of difficult parturition the aid of a skillful veterinary surgeon may be required.

FEEDING AND MANAGEMENT

No branch of dairy farming can compare in importance with the management of cows. The highest success will depend upon it, whatever breed be selected, and whatever amount of care and attention be given to the points of the animals; for experience will show that very little milk comes out of the bag, that is not first put into the throat. It is poor economy, therefore, to attempt to keep too many cows for the amount of feed one has; for it will generally be found that one good cow well-bred and well fed will yield as much as two ordinary cows kept in the ordinary way; while a saving is effected both in labor and room required, and in the risks on the capital invested. If an argument for the larger number on poorer feed is urged on the ground of the additional manure—which is the only basis upon which it can be put—it is enough to say that it is a very expensive way of making manure. It is not too strong an assertion, that a proper regard to profit and economy would require many an American farmer to sell off nearly half of his cows, and to feed the whole of his hay and roots hitherto used into the remainder.

An animal, to be fully fed and satisfied, requires a quantity of food in proportion to its live weight. No feed is complete that does not contain a sufficient amount of nutritive elements; hay, for example, being more nutritive than straw, and grains than roots. The food, too, must possess a bulk sufficient to fill up to a certain degree the organs of digestion of the stomach; and, to receive the full benefit of its food, the animal must be wholly satisfied—since, if the stomach is not sufficiently distended, the food cannot be properly digested, and of course many of the nutritive principles which it contains cannot be perfectly assimilated. An animal regularly fed eats till it is satisfied, and no more than is requisite. A part of the nutritive elements in hay and other forage plants is needed to keep an animal on its feet—that is, to keep up its condition—and if the nutrition of its food is insufficient for this, the weight decreases, and if it is more than sufficient the weight increases, or else this excess is consumed in the production of milk or in labor. About one sixtieth of their live weight in hay, or its equivalent, will keep horned cattle on their feet; but, in order to be completely nourished, they require about one thirtieth in dry substances, and four thirtieths in water, or other liquid contained in their food. The excess of nutritive food over and above what is necessary to sustain life will go, in milch cows, generally to the production of milk, or to the growth of the fœtus, but not in all cows to an equal extent; the tendency to the secretion of milk being much more developed in some than in others.

With regard, however, to the consumption of food in proportion to the live weight of the animal, it must be taken, in common with all general principles, with some qualifications. The proportion is probably not uniform as applied to all breeds indiscriminately, though it may be more so as applied to animals of the same breed. The idea of some celebrated stock-raisers has been that the quantity of food required depends much upon the shape of the barrel; and it is well known that an animal of a close, compact, well-rounded barrel, will consume less than one of an opposite make.

The variations in the yield of milch cows are caused more by the variations in the nutritive elements of their food than by a change of the form in which it is given. A cow, kept through the winter on mere straw, will cease to give milk; and, when fed in spring on green forage, will give a fair quantity of milk. But she owes the cessation and restoration of the secretion, respectively, to the diminution and increase of her nourishment, and not at all to the change of form, or of outward substance in which the nutriment is administered. Let cows receive through winter nearly as large a proportion of nutritive matter as is contained in the clover, lucerne, and fresh grass which they eat in summer, and, no matter in what precise substance or mixture that matter be contained, they will yield a winter's produce of milk quite as rich in caseine and butyraceous ingredients as the summer's produce, and far more ample in quantity than almost any dairyman with old-fashioned notions would imagine to be possible. The great practical error on this subject consists, not in giving wrong kinds of food, but in not so proportioning and preparing it as to render an average ration of it equally rich in the elements of nutrition, and especially in nitrogenous elements, as an average ration of the green and succulent food of summer.

We keep too much stock for the quantity of good and nutritious food which we have for it; and the consequence is, that cows are, in nine cases out of ten, poorly wintered, and come out in the spring weakened, if not, indeed, positively diseased, and a long time is required to bring them into a condition to yield a generous quantity of milk.

It is a hard struggle for a cow reduced in flesh and in blood to fill up the wasted system with the food which would otherwise have gone to the secretion of milk; but, if she is well fed, well housed, well littered, and well supplied with pure, fresh water, and with roots, or other *moist* food, and properly treated to the luxury of a frequent carding, and constant kindness, she comes out ready to commence the manufacture of milk under favorable circumstances.

Keep the cows constantly in good condition, ought, therefore, to be the motto of every dairy farmer, posted up over the barn, and on and over the stalls, and over the milk-room, and repeated to the boys whenever there is danger of forgetting it. It is the great secret of success; and the difference between success and failure turns upon it. Cows in milk require more food in proportion to their size and weight than either oxen or young cattle.

In order to keep cows in milk well and economically, regularity is next in importance to a full supply of wholesome and nutritious food. The animal stomach is a very nice chronometer, and it is of the utmost importance to observe regular hours in feeding, cleaning, and milking. This is a point, also, in which very many farmers are at fault—feeding whenever it happens to be convenient. The cattle are thus kept in a restless condition, constantly expecting food when the keeper enters the barn; while, if regular hours are strictly adhered to, they know exactly when they are to be fed, and they rest quietly till the time arrives. If one goes into any well-regulated dairy establishment an hour before feeding, scarcely an animal will rise to its feet; while, if it happens to be the hour of feeding, the whole herd will be likely to rise and seize their food with an avidity and relish not to be mistaken.

With respect to the exact nurture to be pursued, no rule could be prescribed which would apply to all cases; and each individual must be governed much by circumstances, both regarding the particular kinds of feed at different seasons of the year, and the system of feeding. It has been found—it may be stated—in the practice of the most successful dairymen, that, in order to encourage the largest secretion of milk in stalled cows, one of the best courses is, to feed in the morning, either at the time of milking—which is preferred by many—or immediately after, with cut feed, consisting of hay, oats, millet, or cornstalks, mixed with shorts, and Indian, linseed, or cotton-seed meal, thoroughly moistened with water. If in winter, hot or warm water is far better than cold. If given at milking-time, the cows will generally give down their milk more readily. The stalls and mangers should first be thoroughly cleansed.

Roots and long hay may be given during the day; and at the evening milking, or directly after, another generous meal of cut feed, well moistened and mixed, as in the morning. No very concentrated food, like grains alone, or oil-cakes, should be fed early in the morning on an empty stomach, although it is sanctioned by the practice in the London milk-dairies. The processes of digestion go on best when the stomach is sufficiently distended; and for this purpose the bulk of food is almost as important as the nutritive qualities. The flavor of some roots, as cabbages and turnips, is more apt to be imparted to the flesh and milk when fed on an empty stomach than otherwise. After the cows have been milked and have finished their cut feed, they are carded and curried down, in well-managed dairies, and then either watered in the stall—which, in very cold or stormy weather, is far preferable—or turned out to water in the yard. While they are out, if they are let out at all, the stables are put in order; and, after tying them up, they are fed with long hay, and left to themselves till the next feeding

THE FAMILY PETS.

time. This may consist of roots—such as cabbages, beets, carrots, or turnips sliced—or of potatoes, a peck, or—if the cows are very large—a half-bushel each, and cut feed again at the evening milking, as in the morning; after which, water in the stall, if possible.

The less cows are exposed to the cold of winter, the better. They eat less, thrive better, and give more milk, when kept housed all the time, than when exposed to the cold. A case is on record, where a herd of cows, which had usually been supplied from troughs and pipes in the stalls, were, on account of an obstruction in the pipes, obliged to be turned out thrice a day to be watered in the yard. The quantity of milk instantly decreased, and in three days the diminution became very considerable. After the pipes were mended, and the cows again watered, as before, in their stalls, the flow of milk returned. This, however, must be governed much by the weather; for in very mild and warm days it may be judicious not only to let them out, but to allow them to remain out for a short time, for the purpose of exercise.

Any one can arrange the hour for the several processes named above, to suit himself; but, when once fixed, it should be rigidly and regularly followed. If the regular and full feeding be neglected for even a day, the yield of milk will immediately decline, and it will be very difficult to restore it. It may be safely asserted, as the result of many trials and long practice, that a larger flow of milk follows a complete system of regularity in this respect than from a higher feeding where this system is not adhered to.

One prime object which the dairyman should keep constantly in view is, to maintain the animal in a sound and healthy condition. Without this, no profit can be expected from a milch cow for any considerable length of time; and, with a view to this, there should be an occasional change of food. But, in making changes, great care is requisite in order to supply the needful amount of nourishment, or the cow will fall off in flesh, and eventually in milk. It should, therefore, be remembered that the food consumed goes not alone to the secretion of milk, but also to the growth and maintenance of the bony structure, the flesh, the blood, the fat, the skin, and the hair, and in exhalations from the body. These parts of the body consist of different organic constituents. Some are rich in nitrogen, as the fibrin of the blood and albumen; others destitute of it, as fat; some abound in inorganic salts, phosphate of lime, and salts of potash. To explain how the constant waste of these substances may be supplied, a celebrated chemist observes that the albumen, gluten, caseine, and other nitrogenized principles of food, supply the animal with the materials requisite for the formation of muscle and cartilage; they are, therefore, called flesh-forming principles.

Fats, or oily matters of the food, are used to lay on fat, or for the purpose of sustaining respiration.

Starch, sugar, gum, and a few other non-nitrogenized substances, consisting of carbon, oxygen, and hydrogen, supply the carbon given off in respiration, or they are used for the production of fat.

Phosphate of lime and magnesia in food principally furnish the animal with the materials of which the bony skeleton of its body consists.

Saline substances—chlorides of sodium and potassium, sulphate and phosphate of potash and soda, and some other mineral matters occurring in food—supply the blood, juice of flesh, and various animal juices, with the necessary mineral constituents.

The healthy state of an animal can thus only be preserved by a mixed food; that is, food which contains all the proximate principles just noticed. Starch or sugar alone cannot sustain the animal body, since neither of them furnishes the materials to build up the fleshy parts of the animal. When fed on substances in which an insufficient quantity of phosphates occurs, the animal will become weak, because it does not find any bone-producing principle in its food. Due attention should, therefore, be paid by the feeder to the selection of food which contains all the kinds of matter required, nitrogenized as well as non-nitrogenized, and mineral substances; and these should be mixed together in the proportion which experience points out as best for the different kinds of animals, or the particular purpose for which they are kept.

Relative to the nutrition of cows for dairy purposes, milk may be regarded as a material for the manufacture of butter and cheese; and, according to the purpose for which the milk is intended to be employed, whether for the manufacture of butter or the production of cheese, the cow should be differently fed.

Butter contains carbon, oxygen, and hydrogen, and no nitrogen. Cheese, on the contrary, is rich in nitrogen. Food which contains much fatty matter, or substances which in the animal system are readily converted into fat, will tend to increase the proportion of cream in milk. On the other hand, the proportion of caseine or cheesy matter in milk is increased by the use of highly nitrogenized food. Those, then, who desire much cream, or who produce cream for the manufacture of butter, select food likely to increase the proportion of butter in the milk. On the contrary, where the principal object is the production of milk rich in curd—that is, where cheese is the object of the farmer—clover, peas, bran-meal, and other plants which abound in legumine—a nitrogenized organic compound, almost identical in properties and composition with caseine, or the substance which forms the curd of milk—will be selected.

And so the quality, as well as the quantity, of butter in the milk, depends on the kind of food consumed and on the general health of the animal. Cows fed on turnips in the stall always produce butter inferior to that of cows living upon the fresh and aromatic grasses of the pastures.

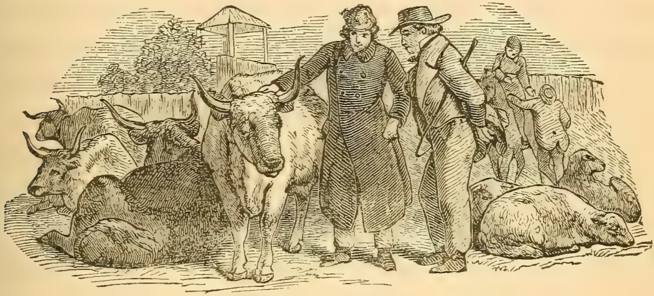
Succulent food in which water abounds—the green grass of irrigated meadows, green clover, brewers' and distillers' refuse, and the like—increases the quantity, rather than the quality, of the milk; and by feeding these substances the milk-dairyman studies his own interest, and makes thin milk without diluting it with water—though, in the opinion of some, this may be no more legitimate than watering the milk.

But, though the yield of milk may be increased by succulent or watery food, it should be given so as not to interfere with the health of the cow.

Food rich in starch, gum, or sugar, which are the respiratory elements, an excess of which goes to the production of fatty matters, increases the butter in milk. Quietness promotes the secretion of fat in animals and increases the butter.

Cheese will be increased by food rich in albumen, such as the leguminous plants.

The most natural, and of course the healthiest, food for milch cows in summer, is the green grass of the pastures; and when these fail from drought or over-stocking, the complement of nourishment may be made up with green clover, green oats, barley, millet, or corn-fodder and cabbage-leaves, or other succulent vegetables; and if these are wanting, the deficiency may be partly supplied with shorts, Indian-meal, linseed or cotton-seed meal. Green grass is more nutritious than hay, which always loses somewhat of its nutritive properties in curing; the amount of the loss depending chiefly on the mode of curing, and the length of exposure to sun and rain. But, apart from this, grass is more easily and completely digested than hay, though the digestion of the latter may be greatly aided by cutting and moistening, or steaming; and by this means it is rendered more readily available, and hence far better adapted to promote a large secretion of milk—a fact too often overlooked even by many intelligent farmers.



BUYING CATTLE.

In autumn, the best feed will be the grasses of the pastures, so far as they are available, green-corn fodder, cabbage, carrot, and turnip leaves, and an addition of meal or shorts. Toward the middle of autumn, the cows fed in the pastures will require to be housed regularly at night, especially in the more northern latitudes, and put, in part at least, upon hay. But every farmer knows that it is not judicious to feed out the best part of his hay when his cattle are first put into the barn, and that he should not feed so well in the early part of winter that he cannot feed better as the winter advances.

At the same time, it should always be borne in mind that the change from grass to a poor quality of hay or straw, for cows in milk, should not be too sudden. A poor quality of dry hay is far less palatable in the early part of winter, after the cows are taken from grass, than at a later period; and, if it is resorted to with milch cows, will invariably lead to a falling off in the milk, which no good feed can afterward wholly restore.

It is desirable, therefore, for the farmer to know what can be used instead of his best English or upland meadow hay, and yet not suffer any greater loss in the flow of milk, or in condition, than is absolutely necessary. In some sections of the Eastern States, the best quality of swale hay will be used; and the composition of that is as variable as possible, depending on the varieties of the grasses of which it was made, and the manner of curing. But, in other sections, many will find it necessary to use straw and other substitutes. Taking good English or meadow hay as the standard of comparison, and calling that one, 4.79 times the weight of rye-straw, or 3.83 times the weight of oat-straw, contains the same amount of nutritive matter; that is, it would take

4.79 times as good rye-straw to produce the same result as good meadow hay.

In winter, the best food for cows in milk will be good sweet meadow hay, a part of which should be cut and moistened with water—as all inferior hay or straw should be—with an addition of root-crops, such as turnips, carrots, parsnips, potatoes, mangold-wurtzel, with shorts, oil-cake, Indian meal, or bean meal.

It is the opinion of most successful dairymen that the feeding of moist food cannot be too highly recommended for cows in milk, especially to those who desire to obtain the largest quantity. Hay cut and thoroughly moistened becomes more succulent and nutritive, and partakes more of the nature of green grass.

As a substitute for the oil-cake, hitherto known as an exceedingly valuable article for feeding stock, there is probably nothing better than cotton-seed meal. This is an article whose economic value has been but recently made known, but which, from practical trials already made, has proved eminently successful as food for milch cows. Chemists have decided that its composition is not inferior to that of the best flaxseed cake, and that in some respects its agricultural value surpasses that of any other kind of oil-cake.

It has been remarked by chemists, in this connection, that the great value of linseed-cake, as an adjunct to hay, for fat cattle and milch cows, has been long recognized ; and that it is undeniably traceable, in the main, to three ingredients of the seeds of the oil-yielding plants. The value of food depends upon the quantities of matters it contains which may be appropriated by the animal which consumes the food.

Now, it is proved that the fat of animals is derived from the starch, gum, and sugar, and more directly and easily from the oil of the food. These four substances, then, are fat-formers. The muscles, nerves, and tendons of animals, the fibrine of their blood and the curd of their milk, are almost identical in composition with, and strongly similar in many of their properties to, matters found in all vegetables, but chiefly in such as form the most concentrated food. These blood (and muscle) formers are characterized by containing about fifteen and a half per cent. of nitrogen; and hence are called nitrogenous substances. They are, also, often designated as the albuminous bodies.

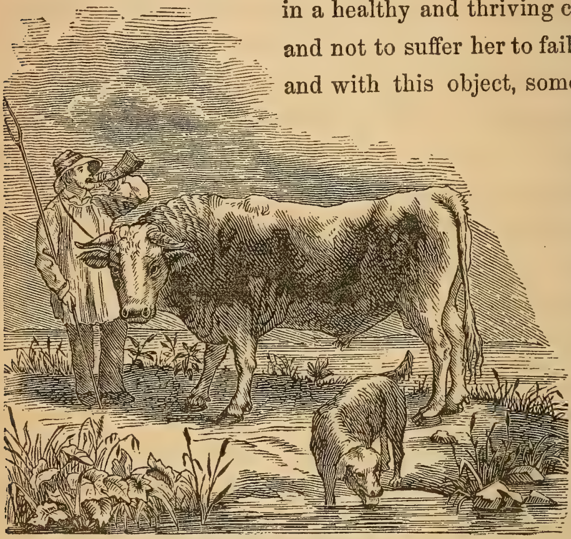
The bony framework of the animal owes its solidity to phosphate of lime, and this substance must be furnished by the food. A perfect food must supply the animal with these three classes of bodies, and in proper proportions. The addition of a small quantity of a food, rich in oil and albuminous substances, to the ordinary kinds of feed, which contain a large quantity of vegetable fibre or woody matter, more or less indigestible, but, nevertheless, indispensable to the herbivorous animals, their digestive organs being adapted to a bulky food, has been found highly advantageous in practice. Neither hay alone nor concentrated food alone gives the best results. A certain combination of the two presents the most advantages.

Some who have used cotton-seed cake have found difficulty in inducing cattle to eat it. By giving it at first in small doses, mixed with other palatable food, they soon learn to eat it with relish. Cotton-seed cake is much richer in oils and albuminous matters than the linseed cake. A correspondingly less quantity will therefore be required. Three pounds of this cotton-seed cake are equivalent to four of linseed cake of average quality.

During the winter season, as has been already remarked, a frequent change of food is especially necessary, both as contributions to the general health of animals, and as a means of stimulating the digestive organs, and thus increasing the secretion of milk. A mixture used as cut feed and well moistened is now especially beneficial, since concentrated food, which would otherwise be given in small quantities, may be united with larger quantities of coarser and less nutritive food, and the complete assimilation of the whole be better secured. On this subject it has been sensibly observed that the most nutritious kinds of food produce little or no effect when they are not digested by the stomach, or if the digested food is not absorbed by the lymphatic vessels, and not assimilated by the various parts of the body. Now, the normal functions of the digestive organs not only depend upon the composition of the food, but also on its volume. The volume or bulk of the food contributes to the healthy action of the digestive organs, by exercising a stimulating effect upon the nerves which govern them. Thus the whole organization of ruminating animals necessitates the supply of bulky food, to keep the animal in good condition.

Feed sweet and nutritious food, therefore, frequently, regularly, and in small quantities, and change it often, and the best results may be confidently anticipated. If the cows are not in milk, but are to come in in the spring, the difference in feeding should be rather in the quantity than the quality, if the highest yield is to be expected from them during the coming season.

The most common feeding is hay alone, and oftentimes very poor hay at that. The main point is to keep the animal in a healthy and thriving condition, and not to suffer her to fail in flesh; and with this object, some change and variety of food are highly important. Toward the close of winter, a herd of cows will begin to come in, or approach their time of calving. Care should then be taken not to feed too rich or stimulating food for the last week or two before this event, as it is often attended with ill consequences. A plenty of hay, a few potatoes or shorts, and pure water will suffice.



CALLING IN THE CATTLE.

In spring, the best feeding for dairy cows will be much the same as that for winter; the roots in store over winter, such as carrots, mangold wurtzel, turnips, and parsnips, furnishing very valuable aid in increasing the quantity and improving the quality of milk. Toward the close of this season, and before the grass of pastures is sufficiently grown to make it judicious to turn out the cows, the best dairymen provide a supply of green fodder in the shape of winter rye, which, if cut while it is tender and succulent, and before it is half grown, will be greatly relished. Unless cut young, however, its stalk soon becomes hard and unpalatable.

All practical dairymen agree in saying that a warm and well-ventilated barn is indispensable to the promotion of the highest yield of milk in winter; and most agree that cows in milk should not be turned out, even to drink, in cold weather; all exposure to cold tending to lessen the yield of milk.

In the London dairies, in which, of course, the cows are fed so as to produce the largest flow of milk, the treatment is as follows: The cows are kept at night in stalls. About three A. M. each has a half-bushel of grains. When milking is finished, each receives a bushel of turnips (or mangolds), and shortly afterward, one tenth of a truss of hay of the best quality. This feeding occurs before eight A. M., when the animals are turned into the yard. Four hours after, they are again tied up in their stalls, and have another feed of grains. When the afternoon milking is over (about three P. M.), they are fed with a bushel of turnips, and after the lapse of an hour, hay is given them as before. This mode of feeding usually continues throughout the cool season, or from November to March. During the remaining months they are fed with grains, tares, and cabbages, and a proportion of rowen, or second-cut hay. They are supplied regularly until they are turned out to grass, when they pass the whole of the night in the field. The yield is about six hundred and fifty gallons a year for each cow.

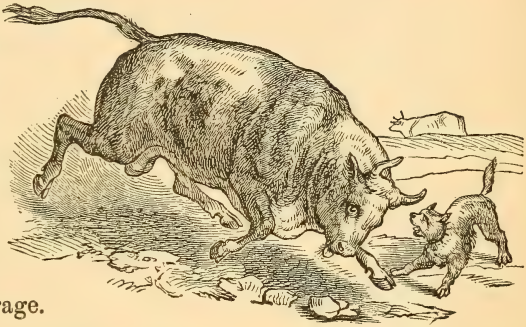
Mr. Harley—whose admirable dairy establishment was erected for the purpose of supplying the city of Glasgow with a good quality of milk, and which has contributed more than any thing else to improve the quality of the milk furnished to all the principal cities of Great Britain—adopted the following system of feeding with the greatest profit: In the early part of the summer, young grass and green barley, the first cutting especially, mixed with a large proportion of old hay or straw, and a good quantity of salt to prevent swelling, were used. As summer advanced, less hay and straw were given, and as the grass approached ripeness, they were discontinued altogether; but young and wet clover was never given without an admixture of dry provender. When grass became scarce, young turnips and turnip leaves were steamed with hay, and formed a good substitute. As grass decreased, the turnips were increased, and at length became a complete substitute. As the season advanced, a large proportion of distillers' grains and wash was given with other food, but these were found to have a tendency to make the cattle grain-sick; and if this feeding were long-continued, the health of the cows became affected. Boiled linseed and short-cut wheat-straw mixed with the grains, were found to prevent the cows from turning sick. As spring approached, Swedish turnips, when cheap, were substituted for yellow turnips. These two roots, steamed with hay and other mixtures, afforded safe food till grass was again in season. When any of the cows were surfeited, the food was withheld till the appetite returned, when a small quantity was given, and increased gradually to the full allowance.

But the most elaborate and valuable experiments in the feeding and management of milch cows, are those made, not long since, by Mr. T. Horsfall, of England, and published in the Journal of the Royal Agricultural Society. His practice, though adapted more especially, perhaps, to his own section, is nevertheless of such general application and importance as to be worthy of attention. By his course of treatment he found that he could produce as much and as rich butter in winter as in summer.

His first object was to afford a full supply of the elements of food adapted to the maintenance, and also to the produce of the animal; and this could not be effected by the ordinary food and methods of feeding, since it is impossible to induce a cow to consume a quantity of hay requisite to supply the waste of the system, and keep up, at the same time, a full yield of the best quality of milk. He used, to some extent, cabbages, kohl rabi, mangolds, shorts, and other substances, rich in the constituents of cheese and butter. "My food for milch cows," says he, "after having undergone various modifications, has for two seasons consisted of rape cake five pounds, and bran two pounds, for each cow, mixed with a sufficient quantity of bean-straw, oat-straw, and shells of oats, in equal proportions, to supply them three times a day with as much as they will eat. The whole of the materials are moistened and blended together, and, after being well steamed, are given to the animal in a warm state. The attendant is allowed one pound to one pound and a half per cow, according to circumstances, of bean-meal, which he is charged to give to each cow in proportion to the yield of milk; those in full milk getting each two pounds per day, others but little. It is dry, and mixed with the steamed food on its being dealt out separately. When this is eaten up, green food is given, consisting of cabbages, from October to December, kohl rabi till February, and mangold till grass time, with a view to nicety of flavor. I limit the quantity of green food to thirty or thirty-five pounds per day for each. After each feed, four pounds of meadow hay, or twelve pounds per day, is given to each cow. They are allowed water twice a day, to the extent which they will drink."

Bean-straw uncooked having been found to be hard and unpalatable, it was steamed to make it soft and pulpy, when it possessed an agreeable odor, and imparted its flavor to the whole mass. It was cut for this purpose just before ripening, but after the bean was fully grown, and in this state was found to possess nearly double the amount of albuminous matter, so valuable to milch cows, of good meadow or upland hay. Bran or shorts is also vastly improved by steaming or soaking with hot water, when its nutriment is more readily assimilated. It contains about fourteen per cent. of albumen, and is rich in phosphoric acid. Rape-cake was found to be exceedingly valuable. Linseed and cotton-seed cake may probably be substituted for it in this country.

Mr. Horsfall turned his cows in May into a rich pasture, housing them at night, and giving them a mess of the steamed mixture and some hay morning and night; and from June to October they had cut grass in the stall, besides what they got in the pasture, and two feeds of the steamed mixture a day. After the beginning of October the cows were kept housed. With such management his cows generally yielded from twelve to sixteen quarts of milk (wine measure) a day, for about eight months after calving, when they fell off in milk, but gained in flesh, up to calving-time. In this course of treatment the manure was far better than the average, and his pastures constantly improved. The average amount of butter from every sixteen quarts of milk was twenty-five ounces—a proportion far larger than the average.


"ON THE RAMPAGE."

How widely does this course of treatment differ from that of most farmers! The object with many seems to be, to see with how little food they can keep the cow alive. From a correct point of view, the milch cow should be regarded as an instrument of transformation. The question should be—with so much hay, so much grain, so many roots, how can the most milk, or butter, or cheese, be made? The conduct of a manufacturer who owned good machinery, and an abundance of raw material, and had the labor at hand, would be considered very senseless, if he hesitated to supply the material, and keep the machinery at work, at least so long as he could run it with profit.

Stimulate the appetite, then, and induce the cow to eat, by a frequent change of diet, not merely enough to supply the constant waste of her system, but enough and to spare, of a food adapted to the production of milk of the quality desired.

SOILING.

Of the advantages of soiling milch cows—that is, feeding exclusively in the barn—there are yet many conflicting opinions. As to its economy of land and feed there can be no question, it being generally admitted that a given number of animals may be abundantly fed on a less space; nor is there much question as to the increased quantity of milk yielded in stall feeding. Its economy, in this country, turns rather upon the cost of labor and time; and the question raised by the dairyman is, whether it will pay—whether its advantages are sufficient to balance the extra expense of cutting and feeding, over and above cropping on the pasture. The importance of this subject has been strongly impressed upon the attention of farmers in many sections of the country, by a growing conviction that something must be done to improve the pastures, or that they must be abandoned altogether.

Thousands of acres of neglected pasture-land in the older States are so poor and worn out that from four to eight acres furnish but a miserable subsistence for a good-sized cow. No animal can flourish under such circumstances. The labor and exertion of feeding are too great, to say nothing of the vastly inferior quality of the grasses in such pastures, compared with those on more recently seeded lands. True economy would dictate that such pastures should either be allowed to run to wood, or be devoted to sheep-walks, or ploughed and improved. Cows, to be able to yield well, must have plenty of food of a sweet and nutritious quality;

and, unless they find it, they wander over a large space, if at liberty, and thus deprive themselves of rest.

If a farmer or dairyman unfortunately owns such pastures, there can be no question that, as a matter of real economy, he had better resort to the soiling system for his milch cows; by which means he will largely increase his annual supply of good manure, and thus have the means of improving, and bringing his land to a higher state of cultivation. A very successful instance of this management occurs in the report of the visiting committee of an agricultural society in Massachusetts, in which they say: "We have now in mind a farmer in this county who keeps seven or eight cows in the stable through the summer, and feeds them on green fodder, chiefly Indian corn. We asked him his reasons for it. His answer was: 1. That he gets more milk than he can by any other method. 2. That he gets more manure, especially liquid manure. 3. That he saves it all, by keeping a supply of mud or mould under the stable, to be taken out and renewed as often as necessary. 4. That it is less troublesome than to drive his cows to pasture; that they are less vexed by flies, and have equally good health. 5. That his mowing land is every year growing more productive, without the expense of artificial manure.—He estimates that on an acre of good land twenty tons of green fodder may be raised. That which is dried is cut fine, and mixed with meal or shorts, and fed with profit. He believes that a reduced and worn-out farm—supposing the land to be naturally good—could be brought into prime order in five years, without any extra outlay of money for manure, by the use of green fodder in connection with the raising and keeping of pigs; not fattening them, but selling at the age of four or five months." He keeps most of his land in grass, improving its quality and productiveness by means of top-dressing, and putting money in his pocket—which is, after all, the true test both for theory and practice.

Another practical case on this point is that of a gentleman in the same State who had four cows, but not a rod of land on which to pasture them. They were, therefore, never out of the barn—or, at least, not out of the yard—and were fed with grass, regularly mown for them; with green Indian corn and fodder, which had been sown broadcast for the purpose; and with about three pints of meal a day. Their produce in butter was kept for thirteen weeks. Two of them were but two years old, having calved the same spring. All the milk of one of them was taken by her calf for six weeks out of the thirteen, and some of the milk of the other was taken for family use, the quantity of which was not measured. These heifers could not, therefore, be estimated as equal to more than one cow in full milk. And yet from these cows no less than three hundred and eighty-nine pounds of butter were made in the thirteen weeks. Another pound would have made an average of thirty pounds a week for the whole time.

It appears from these and other similar instances of soiling, or stall-feeding in summer on green crops cut for the purpose, that the largely increased quantity of the yield fully compensates for the slightly deteriorated quality. And not only is the quantity yielded by each cow increased, but the same extent of land, under the same culture, will carry double or treble the number of ordinary pastures, and keep them in better condition. There is also a saving of manure. But with us the economy of soiling is the exception, and not the rule.

In adopting this system of feeding, regularity is required as much as in any other, and a proper variety of food. A succession of green crops should be provided, as near as convenient to the stable. The first will naturally be winter rye, in the Northern States, as that shoots up with great luxuriance. Winter rape would probably be an exceedingly valuable addition to the plants usually cultivated for soiling in this country, in sections where it would withstand the severity of the winter. Cabbages, kept in the cellar or pit, and transplanted early, will also come in here to advantage, and clover will very soon follow them; oats, millet, and green Indian-corn, as the season advances; and, a little later still, perhaps, the Chinese sugar-cane, which should not be cut till headed out. These plants, in addition to other cultivated grasses, will furnish an unfailing succession of succulent and tender fodder; while the addition of a little Indian, linseed, or cotton-seed meal will be found economical.

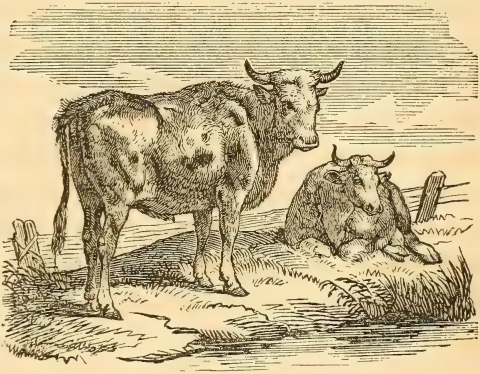
In the vicinity of large towns and cities, where the object is too often to feed for the largest quantity, without reference to quality, an article known as distillers' swill, or still-slop, is extensively used. This, if properly fed in limited quantities, in combination with other and more bulky food, may be a valuable article for the dairyman; but, if given—as it too often is—without the addition of other kinds of food, it soon affects the health and constitution of the animals fed on it. This swill contains a considerable quantity of water, some nitrogenous compounds, and some inorganic matter, in the shape of phosphates and alkaline salts found in the different kinds of grain of which it is made up, as Indian corn, wheat, barley, rye, and the like. Where this forms the principal food of milch cows, the milk is of a very poor quality—blue in color, and requiring the addition of coloring substances to make it saleable. It contains, often, less than one per cent. of butter, and seldom over one and three-tenths or one and a half per cent.—while good, saleable milk should contain from three to five per cent. It will not coagulate, it is said, in less than five or six hours; while good milk will invariably coagulate in an hour or less, under the same conditions. Its effect on the system of young children is, therefore, very destructive, causing diseases of various kinds, and, if continued, death.

So pernicious have been the consequences resulting from the use of this "swill-milk," as it is called, in the largest city of this country, that the Legislature of the State of New York, at a recent session (1861–2), interfered in behalf of the community by making the sale of the article a penal offence.

CULTURE OF GRASSES FOR FODDER.

As has been already stated, the grasses in summer, and hay in winter, form the most natural and important food for milch cows; and, whatever other crops come in as additional, these will form the basis of all systems of feeding.

The nutritive qualities of the grasses differ widely; and their value as feed for cows will depend, to a considerable extent, on the management of pastures and mowing-lands. Some considerations bearing upon the subject of the proper cultivation of these leading articles of food are, therefore, proposed in this article.



PATIENTLY WAITING.

If the turf of an old pasture is carefully examined, it will be found to contain a large variety of plants and grasses adapted for forage; some of them valuable for one purpose, and some for another. Some of them, though possessing a lower percentage of nutritive constituents than others, are particularly esteemed for an early and luxuriant growth, furnishing sweet feed in early spring, before other grasses appear; some of them, for starting more rapidly than others, after having been eaten off by cattle, and, consequently, of great value as pasture grasses. Most grasses will be found to be of a social character, and to do best in a large mixture with other varieties.

In forming a mixture for pasture grasses, the peculiar qualities of each species should, therefore, be regarded: as the time of flowering, the habits of growth, the soil and location on which it grows best, and other characteristics.

Among the grasses found on cultivated lands in this country, the following are considered as among the most valuable for ordinary farm cultivation; some of them being adapted to pastures, and others almost exclusively to mowing and the hay-crop: Timothy, Meadow Foxtail, June or Kentucky Blue Grass, Fowl Meadow, Rough-stalked Meadow, Orchard Grass, Perennial Rye Grass, Italian Rye Grass, Redtop, English Bent, Meadow Fescue, Tall Oat Grass, Sweet-scented Vernal, Hungarian Grass, Red Clover, White or Dutch Clover, and some others.

Of these, the most valuable, all things considered, is TIMOTHY. It forms a large proportion of what is commonly called English, or in some sections meadow, hay, though it originated and was first cultivated in this country. It contains a large percentage of nutritive matter, in comparison with other agricultural grasses. It thrives best on moist, peaty, or loamy soils, of medium tenacity, and is not well suited to very light, sandy lands. On very moist soils, its root is almost always fibrous; while on dry and loamy ones it is bulbous. On soils of the former description, which it especially affects, its growth is rapid, and its yield of hay large, sometimes amounting to three or four tons the acre, depending much, of course, upon cultivation. But, though very valuable for hay, it is not adapted for pasture, as it will neither endure severe grazing, nor is its aftermath to be compared with that of meadow foxtail, and some of the other grasses.

JUNE GRASS, better known in some sections as Kentucky Blue Grass, is very common in most sections of the country, especially on limestone lands, forming a large part of the turf, wherever it flourishes, and being held in universal esteem as a pasture grass. It starts early, but varies much in size and appearance, according to the soil; growing in some places with the utmost luxuriance, and forming the predominant grass; in others, yielding to the other species. If cut at the time of flowering, or a few days after, it makes a good and nutritious hay, though it is surpassed in nutritive qualities by several of the other grasses. It starts slowly after having been cut, especially if not cut very early. But its herbage is fine and uniform, and admirably adapted to lawns, growing well in almost all soils, though it does not endure very severe droughts. It withstands, however, the frosts of winter better than most other grasses.

In Kentucky—a section where it attains its highest perfection and luxuriance, ripening its seeds about the tenth of June—and in latitudes south of that, it sometimes continues green through the mild winters. It requires three or four years to become well set, after sowing, and it does not attain its highest yield as a pasture grass till the sod is even older than that. It is not, therefore, suited to alternate husbandry, where land usually remains in grass but two or three years before being ploughed up. In Kentucky, it is sown any time in winter when the sun is on the ground, three or four quarts of seed being used to the acre. In spring the seeds germinate, when the sprouts are exceedingly fine and delicate. Stock is not allowed on it the first year.

The MEADOW FOXTAIL is also an excellent pasture grass. It somewhat resembles Timothy, but is earlier, has a softer spike, and thrives on all soils except the dryest. Its growth is rapid, and it is greatly relished by stock of all kinds. Its stalks and leaves are too few and light for a field crop, and it shrinks too much in curing to be valuable for hay. It flourishes best in a rich, moist, and rather strong soil, sending up a luxuriant aftermath when cut or grazed off, which is much more valuable, both in quality and nutritive value, than the first crop. In all lands designed for permanent pasture, therefore, it should form a considerable part of a mixture. It will endure almost any amount of forcing, by liquid manures or irrigation. It requires three or four years, after soiling, to gain a firm footing in the soil. The seed is covered with the soft and woolly husks of the flower, and is consequently light; weighing but five pounds to the bushel, and containing seventy-six thousand seeds to the ounce.

The ORCHARD GRASS, or ROUGH COCKSFOOT, for pastures, stands pre-eminent. This is a native of this country, and was introduced into England, from Virginia, in 1764, since which time its cultivation has extended into every country of Europe, where it is universally held in very high estimation. The fact of its being very palatable to stock of all kinds, its rapid growth, and the luxuriance of its aftermath, with its power of enduring the cropping of cattle, have given it a very high reputation, especially as a pasture grass. It blossoms earlier than Timothy; when green, is equally relished by milch cows; requires to be fed closer, to prevent its forming tufts and growing up to seed, when it becomes hard and wiry, and loses much of its nutritive quality. As it blossoms about the same time, it forms an admirable mixture with red clover, either for permanent pasture or mowing. It resists drought, and is less exhausting to the soil than either rye grass or Timothy. The seed weighs twelve pounds to the bushel, and when sown alone requires about two bushels to the acre.

The ROUGH-STALKED MEADOW GRASS is somewhat less common than the June grass, but is considered equally valuable. It grows best on moist, sheltered meadows, where it flowers in June and July. It is readily distinguished from June grass by its having a rough sheath, while the latter has a smooth one, and by having a fibrous root, while the root of the other is creeping. It possesses very considerable nutritive qualities, and comes to perfection at a desirable time, and is exceedingly relished by cattle, horses and sheep. For suitable soils it should form a portion of a mixture of seeds, producing, in mixture with other grasses which serve to shelter it, a large yield of hay, far above the average of grass usually sown on a similar soil. It should be cut when the seed is formed. Seven pounds of seed to the acre will make a good sward. The grass loses about seventy per cent. of its weight in drying. The nutritive qualities of its aftermath exceed very considerably those of the crop cut in the flower or in the seed.

FOWL MEADOW GRASS is another indigenous species, of great value for low and marshy grounds, where it flourishes best; and, if cut and properly cured, makes a sweet and nutritious hay, which, from its fineness, is eaten by cows without waste. According to Sinclair—who experimented, with the aid of Sir Humphrey Davy, to ascertain its comparative nutritive properties—it is superior in this respect to either meadow foxtail, orchard grass, or tall meadow oat grass; but it is probable that he somewhat overrates it. If allowed to stand till nearly ripe, it falls down, but sends up innumerable flowering stems from the joints, so that it continues green and luxuriant till late in the season. It thrives best in mixture with other grasses, and deserves a prominent place in all mixtures for rich, moist pastures, and low mowing-lands.

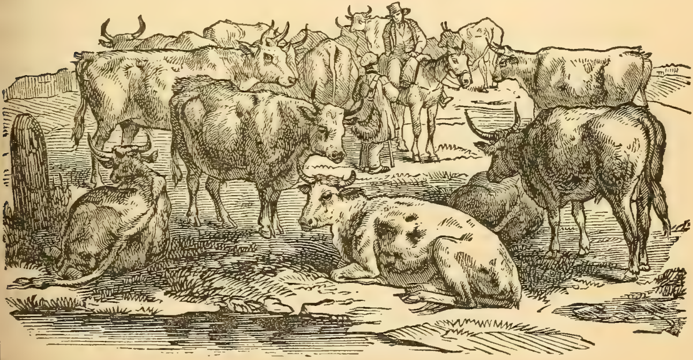
Rye Grass has a far higher reputation abroad than in this country, and probably with reason; for it is better adapted to a wet and uncertain climate than to a dry and hot one. It varies exceedingly, depending much on soil and culture; but, when cut in the blossom to make into hay, it possesses very considerable nutritive power. If allowed to get too ripe, it is hard and wiry, and not relished by cows. The change from a juicy and nutritious plant to a woody fibre, containing but little soluble matter, is very rapid. Properly managed, however, it is a tolerably good grass, though not to be compared to Timothy, or orchard grass.

Redtop is a grass familiar to every farmer in the country. It is the Herd's grass of Pennsylvania, while in New York and New England it is known by a great variety of names and assumes a great variety of forms, according to the soil in which it grows. It is well adapted to almost every soil, though it seems to prefer a moist loam. It makes a profitable crop for spending, in the form of hay, though its yield is less than that of Timothy. It is well suited to our permanent pastures, where it should be fed close, otherwise it becomes wiry and innutritious, and cattle refuse it. It stands the climate of the country as well as any other grass, and so forms a valuable part of any mixture for pastures and permanent mowing-lands; but it is, probably, rather overrated by us.

English Bent, known also by a number of other names, is largely cultivated in some sections. It closely resembles redtop, but may be distinguished from it by the roughness of the sheaths when the hand is drawn from above downward. It possesses about the same qualities as redtop.

MEADOW FESCUE is one of the most common of the fescue grasses, and is said to be the Randall grass of Virginia. It is an excellent pasture grass, forming a very considerable portion of the turf of old pasture lands and fields; and is more extensively propagated and diffused from the fact that it ripens its seeds before most other grasses are cut, and sheds them to spring up and cover the ground. Its long and tender leaves are much relished by cattle. It is rarely sown in this country, notwithstanding its great and acknowledged value as a pasture grass. If sown at all, it should be in mixture with other grasses, as orchard grass, and rye grass, or June grass. It is of much greater value at the time of flowering than when the seed is ripe.

THE TALL OAT GRASS is the Ray grass of France. It furnishes a luxuriant supply of foliage, is valuable either for hay or for pasture, and has been especially recommended for soiling purposes, on account of its early and luxuriant



A CHANCE FOR A SELECTION.

growth. It is often found on the borders of fields and hedges, woods and pastures, and is sometimes very plenty in mowing-lands. After having been mown it shoots up a very thick aftermath, and, on this account, partly, is regarded of nearly equal excellence with the common foxtail.

It grows spontaneously on deep, sandy soils, when once naturalized. It has been cultivated to a considerable extent in this country, and is esteemed by those who know it mainly for its early, rapid, and late growth, making it very well calculated as a permanent pasture grass. It will succeed on tenacious clover soil.

The SWEET-SCENTED VERNAL GRASS is one of the earliest in spring and one of the latest in autumn; and this habit of growth is one of its chief excellencies, as it is neither a nutritious grass, nor very palatable to stock of any kind, nor does it yield a very good crop. It is very common in New England and all over the Middle States, coming into old worn-out fields and moist pastures spontaneously, and along every roadside. It derives its name from its sweetness of odor when partially wilted or crushed in the hand, and it is this chiefly which gives the delicious fragrance to all new-mown hay. It is almost the only grass that possesses a strongly-marked aromatic odor, which is imparted to other grasses with which it is cured. Its seed weighs eight pounds to the bushel. In mixtures for permanent pastures it may be of some value.

HUNGARIAN GRASS, or millet, is an annual forage plant, introduced into France in 1815, and more recently into this country. It germinates readily, and withstands the drought remarkably, remaining green when other grasses are parched and dried up. It has numerous succulent leaves which furnish an abundance of sweet fodder, greatly relished by stock of all kinds. It attains its greatest luxuriance on soils of medium consistency and richness, but does very well on light and dry plains.

Red Clover is an artificial grass of the leguminous family, and one of the most valuable cultivated plants for feeding to dairy cows. It flourishes best on tenacious soils and stiff loams. Its growth is rapid, and a few months after sowing are sufficient to supply an abundant sweet and nutritious food. In the climate of New England, clover should be sown in the spring of the year, while most of the natural grasses do far better when sown in the fall. It is often sown with perfect success on the late snows of March or April, and soon finds its way down into the soil and takes a vigorous hold with its root. It is valuable not only as a forage plant, but as shading the ground, and thereby increasing its fertility.

The introduction of clover among the cultivated plants of the farm has done more, perhaps, for modern agriculture than that of any other single plant. It is now considered indispensable in all good dairy districts.

White Clover, often called Honeysuckle, is also widely diffused over this country, to which it is undoubtedly indigenous. As a mixture in all pasture grasses it holds a very high rank, as it is exceedingly sweet and nutritious, and relished by all kinds of stock. It grows most luxuriantly in moist grounds and moist seasons, but easily accommodates itself to a great variety of circumstances.

With respect to the mixtures of grass-seeds most profitable for the dairy farmer, no universal rule can be given, as they depend very much upon the nature of the soil and the locality. The most important point to be observed, and the one as to which, probably, the greatest deficiency exists, is to use a large number of species, with smaller quantities of each than those most commonly used. This is Nature's rule; for, in examining the turf of a rich old pasture, a large number of different species will be found growing together, while, if the turf of a field sown without two or three species is examined, a far less number of plants is found to the square foot, even after the sod is fairly set. In the opinion of the most competent judges, no improvement in grass culture is more important than this.

As an instance of what he would consider an improvement on the ordinary mixtures for *permanent pastures*, Mr. Flint, in his "Milch Cows and Dairy Farming," suggests the following as likely to give satisfactory results, dependent, of course, to a considerable extent, on the nature and preparation of the soil:

Meadow Foxtail,	flowering in	May and June,	2	pounds.
Orchard Grass,	" "	" "	6	"
Sweet-scented Vernal,	" "	April and May,	1	"
Meadow Fescue,	" "	May and June,	2	"
Redtop,	" "	June and July,	2	"
June Grass,	" "	May and June,	4	"
Italian Rye Grass,	" "	June,	4	"
Perennial do.,	" "	" "	6	"
Timothy,	" "	June and July,	3	"
Rough-stalked Meadow Grass,		" "	2	"
Perennial Clover,	flowering in	June,	3	"
White Clover,	" "	May to September	5-40	"

For mowing-lands the mixture would, of course, be somewhat changed. The meadow foxtail and sweet-scented vernal would be left out entirely, and some six or eight pounds added to the Timothy and red clover. The proper time to lay down lands to grass in the latitude of New England is August or September, and no grain crop should be sown with the seed.

Stiff or clayey pastures should never be overstocked, but when fed pretty close the grasses are far sweeter and more nutritious than when they are allowed to grow up rank and coarse; and if, by a want of sufficient feeding, they get the start of the stock, and grow into rank tufts, they should be cut and removed, when a fresh grass will start up, similar to the aftermath of mowing-lands, which will be eaten with avidity. Grasses for curing into hay should be cut either at the time of flowering, or just before, especially if designed for milch cows. They are then more succulent and juicy, and, if properly cured, form the sweetest food.

Grass cut in the blossom will make more milk than if allowed to stand later. Cut a little before the blossoming; it will make more than when in blossom, and the cows prefer it, which is by no means an unimportant consideration, since their tastes should always be consulted. Grass cut somewhat green, and properly cured, is next to fresh, green grass in palatable, nutritive qualities. Every farmer knows the milk-producing properties of rowen, or second crop, which is generally cut before it ripens.

No operation on the farm is of greater importance to the dairyman than the cutting of his grass and the manner of curing hay; and in this respect the practice over the country generally is susceptible of very marked improvement. The chief object is to preserve the sweetness and succulence of the grass in its natural state, so far as possible; and this object cannot be attained by exposing it too long to the scorching suns and drenching rains to which our climate is liable. As a general thing, farmers try to make their hay too much.

As to the best modes of curing clover, the following, among others, is adopted by many successful farmers: What is mown in the morning is left in the swath, to be turned over early in the afternoon. At about four o'clock, or while it is still warm, it is put into small cocks with a fork, and, if the weather is favorable, it may be housed on the fourth or fifth day, the cocks being turned over on the morning of the day in which it is to be carted. By this method all the heads and leaves are saved, and these are more valuable than the stems. For new milch cows in winter scarcely any food is better. It will cause them to give as great a flow of milk as any hay, unless it be good rowen.

Indian Corn makes an exceedingly valuable fodder, both as a means of carrying a herd of milch cows through our severe droughts of summer, and as an article for soiling cows kept in the stall. No dairy farmer will neglect to sow an extent in proportion to the number of cows which he keeps. The most common practice is, to sow in drills from two and a half to three feet apart, on land well tilled and thoroughly manured, making the drills from six to ten inches wide with the plough, manuring in the furrow, dropping the kernels about two inches apart, and covering with the hoe. In this mode of culture, the cultivator may be used between the rows when the corn is from six to twelve inches high, and, unless the ground is very weedy, no other after culture is needed. The first sowing usually takes place about the middle of May, and this is succeeded by other sowings, at intervals of a week or ten days, till July, in order to have a succession of green fodder; but, if it is designed to cut it up to cure for winter use, an early sowing is generally preferred, in order to be able to cure it in warm weather, in August or early in September. Sown in this way, about three or four bushels of corn are required for an acre; since, if sown thickly, the fodder is better, the stalks smaller, and the waste less.

The chief difficulty in curing corn cultivated for this purpose, and after the methods just spoken of, arises from the fact that it comes at a season when the weather is often colder, the days shorter, and the dews heavier, than when the curing of hay takes place. Nor is the curing of corn cut up green so easy and simple as that of the drying of stalks of Indian corn cut above the ear, as in the common practice of topping. The plant is then riper, less juicy, and cures more readily.

The method sometimes adopted is to cut and tie into small bundles, after it is somewhat wilted, and then to stook upon the ground, where it is allowed to stand, subject to all the changes of weather, with only the protection of the stook itself. The stooks consist of bunches of stalks first bound into small bundles, and are made sufficiently large to prevent the wind from blowing them over. The arms are thrown around the tops to bring them as closely together as possible, when the tops are broken over or twisted together, or otherwise fastened, in order to make the stook "shed tne rain" as well as possible. In this condition they remain out until they are sufficiently dried to be put in the barn. Corn fodder is very excellent for young dairy stock.

Common Millet is another very valuable crop for fodder in soiling, or to cure for winter use, but especially to feed out during the usual season of drought. Many varieties of millet are cultivated in this country, the ground being prepared and treated as for oats. If designed to cut for green fodder, half a bushel of seed to the acre should be used; if to ripen seed, twelve quarts, sown broadcast, about the last of May or early in June. A moist loam or muck is the best soil adapted to millet; but very great crops have been grown on dry upland. It is very palatable and nutritious for milch cows, both green and when properly cured. The curing should be very much like that of clover, care being taken not to over-dry it. For fodder, either green or cured, it is cut before ripening. In this state all cattle eat it as readily as green corn, and a less extent will feed them. Millet is worthy of a widely-extended cultivation, particularly on dairy farms. Indian millet is another cultivated variety.

Rye, as a fodder plant, is chiefly valuable for its early growth in spring. It is usually sown in September or October—from the middle to the end of September being, perhaps, the most desirable time—on land previously cultivated and in good condition. If designed to ripen only, a bushel of seed is required to the acre, evenly sown; but, if intended for early fodder in spring, two or two and a half bushels of seed per acre should be used. On warm land the rye can be cut green the last of April or the first of May.

Care should be taken to cut early; since, if it is allowed to advance too far towards maturity, the stalk becomes hard and unpalatable to cows.

OATS are also sometimes used for soiling, or for feeding green, to eke out a scanty supply of pasture feed; and for this purpose they are valuable. They should be sown on well-tilled and well-manured land, about four bushels to the acre, towards the last of April or the first of May. If the whole crop is to be used as green fodder, five bushels of seed will not be too much for good, strong soil. They will be sufficiently grown to cut by the first of July, or in some sections earlier, depending upon the location.

The CHINESE SUGAR-CANE also may deserve attention as a fodder plant. Experiments thus far made would seem to show that when properly cultivated, and cut at the right time, it is a palatable and nutritious plant, while many of the failures have been the result of too early cutting. For a fodder crop the drill culture is preferable, both on account of the larger yield obtained and because it is thus prevented from becoming too hard and stalky.

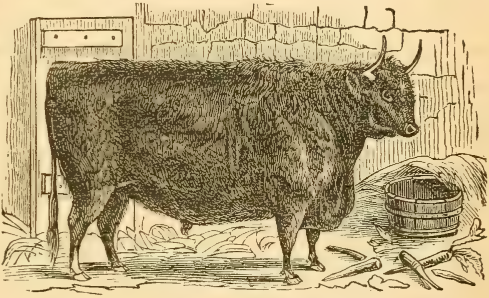
Of the root crops the POTATO is the first to be mentioned. This produces a large quantity of milk, though the quality is inferior. The market value of this root is, at times, too great to allow of feeding extensively with it, even in milk dairies, where it is most valuable as a food for cows; still, there are locations where it may be judicious to cultivate this root for dairy feed, and in all circumstances there is a certain portion of the crop of unmarketable size, which will be of value fed to milch cows or swine. It should be planted in April or May, but in many sections in June, on good mellow soil, first thoroughly plowed and harrowed, then furrowed three feet apart, and manured in the furrows with a mixture of ashes, plaster of Paris, and salt. The seed may be dropped in the furrows, one foot apart, after the drill system—or in hills, two and a half or three feet apart—to be covered with the plough by simply turning the furrows back, after which the whole should be rolled with the field-roller, when it can be done.

If the land is not already in good heart from continued cultivation, a few loads of barnyard manure may be spread, and plowed under by the first plowing. Used in this way it is far less liable to cause the rot, than when it is put in the hill. If a sufficient quantity of wood-ashes is not at hand, sifted coal-ashes will answer the purpose, and these are said to be valuable as a preventive of rot. In this way, one man, two boys, and a horse can plant from three to four acres a day on mellow land.

By another method two acres a day on the sod have been planted. The manure is first spread upon the grass, and then a furrow made by a yoke of oxen and one man, another following after and dropping, a foot apart, along the outer edge of the furrow on the grass. By quick work, one hand can nearly keep up with the plow in dropping. When arrived at the end of the piece, a back furrow is turned up to the potatoes, and a good plowman will cover nearly all without difficulty. On the return furrow, the man or boy who dropped follows after, covering up any that may be left or displaced, and smoothing off the top of the back-furrows when necessary. Potatoes thus planted have come out finely.

The cost of cultivation in this mode, it must be evident, is but trifling, compared with the slower method of hand-planting. It requires a skillful ploughman, a quick, active lad, and a good yoke of oxen, and the extent of the work will depend somewhat upon the state of the turf. The nutritive equivalent for potatoes in a hundred pounds of good hay is 319 pounds; that is, it will take 3.19 pounds of potatoes to afford the same amount of nourishment as one pound of hay. The great value of roots is as a change or condiment calculated to keep the animal in a healthy condition.

The Carrot is somewhat extensively fed, and is a valuable root for milch cows. This, like the potato, has been cultivated and improved from a wild plant. Carrots require a deep, warm, mellow soil, thoroughly cultivated, but clean, and free from weed-seed. The difference between a very good profit and a loss on the crop depends much upon the use of land and manures perfectly free from foul seeds of any kind. Ashes, guano, seaweed, ground bones, and other similar substances, or thoroughly-rotted and fermented compost, will answer the purpose.



A WEST HIGHLAND OX.

After plowing deep, and harrowing carefully, the seed should be planted with a seed-sower, in drills about eighteen inches apart, at the rate of four pounds to the acre, about the middle of May. The difference between sowing on the fifteenth of May and on the tenth of June in New England is said to be nearly one-third in the crop on an average of years. In weeding, a little wheel-hoe is invaluable, as with it a large part of the labor of cultivation is saved. A skillful hand can run this hoe within a half an inch of the young plants without injury, and go over a large space in the course of a day, if the land was properly prepared in the first place.

The American farmer should always plan to economize labor, which is the great item of expense upon a farm. By this is not meant that he should strive to shirk or avoid work, but that he should make the least amount of work accomplish the greatest and most profitable results. Labor-saving machinery on the farm is applied, not to reduce the number of hours of labor, or to make the owner a man of leisure—who is, generally, the unhappiest man in the world—but to enable him to accomplish the greatest results in the same time that he would be compelled to obtain smaller ones.

Carrots will continue to grow and increase in size late into the fall. When ready to dig, plow around as near to the outside rows as possible, turning away the furrow from the row. Then take out the carrots, pulling off the tops, and throw the carrots and tops into separate heaps on the plowed furrows. In this way a man and two boys can harvest and put into the cellar upwards of a hundred bushels a day.

The TURNIP, and the Swedish turnip, or ruta baga, are also largely cultivated as a field crop to feed to stock; and for this purpose almost numberless varieties are used, furnishing a great amount of succulent and nutritious food, late into winter, and, if well-kept, late into spring. The chief objection to the turnip is, that it taints the milk. This may be remedied—to a considerable extent, if not wholly—by the use of salt, or salt hay, and by feeding at the time of milking, or immediately after, or by steaming before feeding, or putting a small quantity of the solution of nitre into the pail, and milking upon it.

Turnips may be sown any time in June, in rich land, well mellowed by cultivation. Very large crops are obtained, sown as late as the middle of July, or the first of August, on an inverted sod. The Michigan, or double-mould-board plow leaves the land light, and in admirable condition to harrow, and drill in turnips. In one instance, a successful root-grower cut two tons of hay to the acre, on the twenty-third of June, and after it was removed from the land spread eight cords of rotten kelp to the acre, and plowed in; after which about three cords of fine old compost manure were used to the acre, which was sown with ruta baga seed, in drills, three feet apart, plants thinned to eight or ten inches in the drill. No after cultivation was required. On the fifteenth of November he harvested three hundred and seventy bushels of splendid roots to the acre, carefully measured off.

The nutritive equivalent of Swedish turnips as compared with good meadow hay is 676, taking hay as a standard at 100; that is, it would require 6.76 pounds of turnips to furnish the same nutriment as one pound of good hay; but fed in connection with other food—as hay, for example—perhaps five pounds of turnips would be about equal to one pound of hay

The English or round turnip is usually sown broadcast after some other crop, and large and valuable returns are often obtained. The Swede is sown in drills. Both of these varieties are used for the production of milk.

The chief objection to the turnip crop is that it leaves many kinds of soil unfit for a succession of some other crops, like Indian corn, for instance. In some sections, no amount of manuring appears to make corn do well after turnips or ruta bagas.

The MANGOLD WURTZEL, a variety of the common beet, is often cultivated in this country with great success, and fed to cows with advantage, furnishing a succulent and nutritive food in winter and spring. The crop is somewhat uncertain. When it does well, an enormous yield is often obtained; but, not rarely, it proves a failure, and is not, on the whole, quite as reliable as the ruta baga, though a more valuable crop when the yield is good. It is cultivated like the common beet in moist, rich soils, three pounds of seed to the acre. The leaves may be stripped off, towards fall, and fed out, without injury to the growth of the root. Both mangolds and turnips should be cut with a root-cutter, before being fed out.

The PARSNIP is a very sweet and nutritious article of fodder, and adds richness and flavor to the milk. It is worthy of extended culture in all parts of the country where dairy husbandry is pursued. It is a biennial, easily raised on deep, rich, well-cultivated and well-manured soils, often yielding enormous crops, and possessing the decided advantage of withstanding the severest winters. As an article of spring feeding, therefore, it is exceedingly valuable. Sown in April or May, it attains a large growth before winter. Then, if desirable, a part of the crop may be harvested for winter use, and the remainder left in the ground till the frost is out, in March or April, when they can be dug as wanted, and are exceedingly relished by milch cows and stock of all kinds. They make an admirable feed at the time of milking, and produce the richest cream, and the yellowest and finest-flavored butter, of any roots used among us. The best dairy farmers on the Island of Jersey often feed to their cows from thirty to thirty-five pounds of parsnips a day, in addition to hay or grass.

Both practical experiment and scientific analysis prove this root to be eminently adapted to dairy stock, where the richness of milk or fine-flavored butter is any object. For mere milk-dairies, it is not quite so valuable, probably, as the Swedish turnip. The culture is similar to that of carrots, a rich, mellow, and deep loam being best; while it has a great advantage over the carrot in being more hardy, and rather less liable to injury from insects, and more nutritive. For feeding and fattening stock it is eminently adapted.

To be sure of a crop, fresh seed must be had, as it cannot be depended on for more than one year. For this reason the largest and straightest roots should be allowed to stand for seed, which, as soon as nearly ripe, should be taken out and spread out to dry, and carefully kept for use. For field culture, the hollow-crowned parsnip is the best and most profitable; but on thin, shallow soils the turnip-rooted variety should be used. Parsnips may be harvested like carrots, by plowing along the rows. Let butter or cheese dairymen give this crop a fair and full trial, and watch its effect in the quality of the milk and butter.

The Kohl Rabi is also cultivated to a considerable extent in this country for the purpose of feeding stock. It is supposed to be a hybrid between the cabbage and the turnip, and is often called the cabbage-turnip, having the root of the former, with a turnip-like or bulbous stem. The special reason for its more extensive cultivation among us is its wonderful indifference to droughts, in which it seems to flourish best, and to bring forth the most luxuriant crops. It also withstands the frosts remarkably, being a hardy plant. It yields a somewhat richer quality of milk than the ordinary turnip, and the crop is generally admitted to be as abundant and profitable. Very large crops of it have been produced by the ordinary turnip or cabbage cultivation. As in cabbage-culture, it is best to sow the seed in March or April, in a warm and well-enriched seed-bed; from which it is transplanted in May, and set out after the manner of cabbages in garden culture. It bears transplanting better than most other roots. Insects injure it less than the turnip, dry weather favors it, and it keeps well through winter. For these reasons, it must be regarded as a valuable addition to our list of forage plants adapted to dairy farming. It grows well on stronger soils than the turnip requires.

Linseed Meal is the ground cake of flaxseed after the oil is pressed out. It is very rich in fat-forming principles, and given to milch cows increases the quality of butter, and keeps them in condition. Four or five pounds a day are sufficient for cows in milk, and this amount will effect a great saving in the cost of other food, and at the same time make a very rich milk. It is extensively manufactured in this country, and largely exported, but it is worthy of more general use here. It must not be fed in too large quantities to milch cows, for it would be liable to give too great a tendency to fat, and thus affect the quantity of the milk.

Cotton-seed Meal is an article of comparatively recent introduction. It is obtained by pressing the seed of the cotton-plant, which extracts the oil, when the cake is crushed or ground into meal, which has been found to be a very valuable article for feeding stock. From analysis it is shown to be equal or superior to linseed meal. Practical experiments only are needed to establish it. It can be procured in market at a reasonable price.

The Manures used in this country for the culture of the above named plants are mostly such as are made on the farm, consisting chiefly of barnyard composts of various kinds, with often a large admixture of peat-mud. There are few farms that do not contain substances, which, if properly husbanded, would add very greatly to the amount of manure ordinarily made. The best of the concentrated manures, which it is sometimes necessary to use, for want of time and labor to prepare enough upon the farm, is, unquestionably, Peruvian guano. The results of this, when properly applied, are well known and reliable, which can hardly be said of any other artificial manure offered for the farmer's notice. The chief objection to depending upon manures made off the farm is, in the first place, their great expense; and in the second—which is equally important—the fact, that, though they may be made valuable, and produce at one time the best results, a want of care in the manufacture, or designed fraud, may make them almost worthless, with the impossibility of detecting the imposition, without a chemical analysis, till it becomes too late, and the crop is lost.

It is, therefore, safest to rely mainly upon the home manufacture of manure. The extra expense of soiling cattle, saving and applying the liquid manure, and thus bringing the land to a higher state of cultivation, when it will be capable of keeping more stock and furnishing more manure, would offer a surer road to success than a constant outlay for concentrated fertilizers.

THE BARN.

The farm barn, next to the farm house, is the most important structure of the farm itself, in the Northern and Middle States; and even at the South and Southwest, where barns are less used, they are of more importance in the economy of farm management than is generally understood. Indeed, to the eyes of a person of taste, a farm or plantation appears incomplete, without good barn accommodations, as much as without good household appointments—and without them, no agricultural establishment can be complete in all its proper economy.

The most *thorough* barn structures, perhaps, to be seen in the United States, are those of the State of Pennsylvania, built by the German farmers of the lower and central counties. They are large, and expensive in their construction; and, in a strictly economical point of view, are, perhaps, more costly than is required. Yet, there is a substantial durability about them, that is exceedingly satisfactory, and, where the pecuniary ability of the farmer will admit, they may well furnish models for imitation.

In the structure of the barn, and in its interior accommodation, much will depend upon the branches of agriculture to which the farm is devoted. A farm cultivated in grain chiefly requires but little room for stabling purposes. Storage for grain in the sheaf, and granaries, will require its room; while a stock farm requires a barn with extensive hay storage, and stables for its cattle, horses, and sheep, in all climates which do not admit of such stocks living through the winter in the field, as is the case in the great grazing districts west of the Alleghanies. Again, there are wide districts of country where a mixed husbandry of grain and stock is pursued, which require barns and outbuildings accommodating both.

It may be well here to remark that many designers of barns, sheds, and other out-buildings for the accommodation of farm stock, have indulged in fanciful arrangements for the comfort and convenience of animals, which are so complicated that when constructed, as they sometimes are, the practical, common-sense farmer will not use them; and by reason of the learning which is required for their use, they are altogether unsuitable for the treatment and use which they generally receive from those who have the daily care of the stock for which they are intended, and for the rough usage which they experience from the animals themselves. A very pretty and plausible arrangement of stabling, feeding, and all the other requirements of a barn establishment may be thus got up by an ingenious theorist at the fireside, which will work charmingly as he dilates upon its good qualities, untried; but, which, when subjected to experiment, will be utterly worthless for practical use. There can be no doubt that the simplest plan of construction, consistent with an economical expenditure of the material of food for the consumption of stock, is by far the most preferable.

Another item to be considered in this connection, is the comparative value of the stock, the forage fed to them, and the labor expended in feeding and taking care of them. To illustrate: Suppose a farm to lie in the vicinity of a large town or city. Its value is, perhaps, a hundred dollars an acre. The hay cut upon it is worth fifteen dollars a ton, at the barn, and straw and coarse grains in proportion, and hired labor ten or twelve dollars a month. Consequently, the manager of this farm should use all the economy in his power, by the aid of cutting-boxes and other machinery, to make the least amount of forage supply the wants of his stock; and the internal economy of his barn should be arranged accordingly, since labor is his cheapest item, and food his dearest. Therefore, any contrivance by which to work up his forage the closest—by way of machinery, or manual labor—so that it shall serve the purposes of keeping his stock, is true economy; and the making and saving of manures are items of the first importance. His buildings and their arrangements throughout should, for these reasons, be constructed in accordance with his practice.

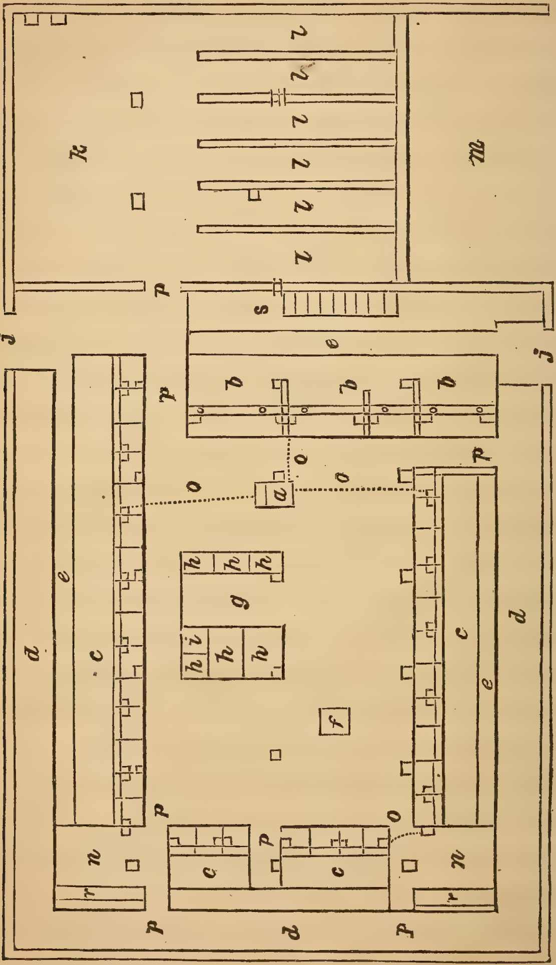
If, on the other hand, lands are cheap and productive, and labor comparatively dear, a different practice will prevail. The farmer will feed his hay from the mow without cutting. The straw will be stacked out, and the cattle turned to it, to pick what they like of it, and make their beds of the remainder; or, if it is housed, he will throw it into racks, and the stock may eat what they choose. To do this requires but one-third, or one-half of the labor which is required by the other mode, and the saving in this makes up, and perhaps more than makes up, for the increased quantity of forage consumed.

Again, climate may equally affect the mode of winter-feeding the stock. The winters may be mild. The hay may be stacked in the fields when gathered, or put into small barns built for hay storage alone; and the manure, scattered over the fields by the cattle, as they are fed from either of them, may be knocked to pieces with the dung-beetle, in the spring, or harrowed and bushed over the ground; and with the very small quantity of labor required in all this, such practice will be more economical than any other which can be adopted.

In latitudes, however, in which it becomes necessary to stall-feed during several months of the year, barns are indispensable. These should be warm, and at the same time well ventilated. The barn should be arranged in a manner suitable to keeping hay and other fodder dry and sweet, and with reference to the comfort and health of the animals, and the economy of labor and manure. The size and finish will, of course, depend on the wants and means of the farmer or dairyman; but many little conveniences, it should not be forgotten, can be added at comparatively trifling cost.

The accompanying cut of a barn is given merely as an illustration of a convenient arrangement for a medium-sized dairy, and not as being adapted to all circumstances or situations. This barn is supposed to stand upon a side-hill or an inclined surface, where it is easy to have a cellar, if desired;

and the cattle-room, as shown in the cut, is in the second story, or directly over the cellar, the bottom of which should



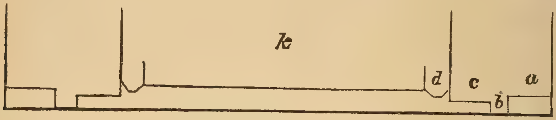
BARN FOR THIRTY-FOUR COWS AND THREE YOKE OF OXEN.

be somewhat dished, or lower in the middle than around the outer sides, and carefully paved, or laid in cement.

On the outside is represented an open shed, *m*, for carts and wagons to remain under cover, thirty feet by fifteen, while *l l l l l l* are bins for vegetables, to be filled through scuttles from the floor of the story above, and surrounded by solid walls. The area of this whole floor equals one hundred feet by fifty-seven. *k*, is an open space, nearly on a level with the cow-chamber, through the door *p*. *s*, stairs to the third story and to the cellar. *d d d*, passage next to the walls, five feet wide, and nine inches above the dung-pit *e e e*, dung-pit, two feet wide, and seven inches below the floor where the cattle stand. The manure drops from this pit into the cellar below, five feet from the walls, and quite around the cellar. *c c c*, plank floor for cows, four feet six inches long. *b b b*, stalls for three yoke of oxen, on a platform five feet six inches long. *n n*, calf-pens, which may also be used for cows in calving. *r r*, feeding-troughs for calves. The feeding-boxes are made in the form of trays, with partitions between them. Water comes in by a pipe, to cistern *a*. This cistern is regulated by a cock and ball, and the water flows by dotted lines, *o o o*, to the boxes; each box being connected by lead pipes well secured from frost, so that, if desired, each animal can be watered without leaving the stall, or water can be kept constantly before it. A scuttle, through which sweepings and refuse may be put into the cellar, is seen at *f*. *g* is a bin receiving cut hay from the third story, or hay-room. *h h h h h h*, bins for grain-feed. *i* is a tunnel to conduct manure or muck from the hay-floor to the cellar. *j j*, sliding-doors on wheels. The cows all face toward the open area in the centre.

This cow-room may be furnished with a thermometer, clock, etc., and should always be well ventilated by sliding windows, which at the same time admit the light.

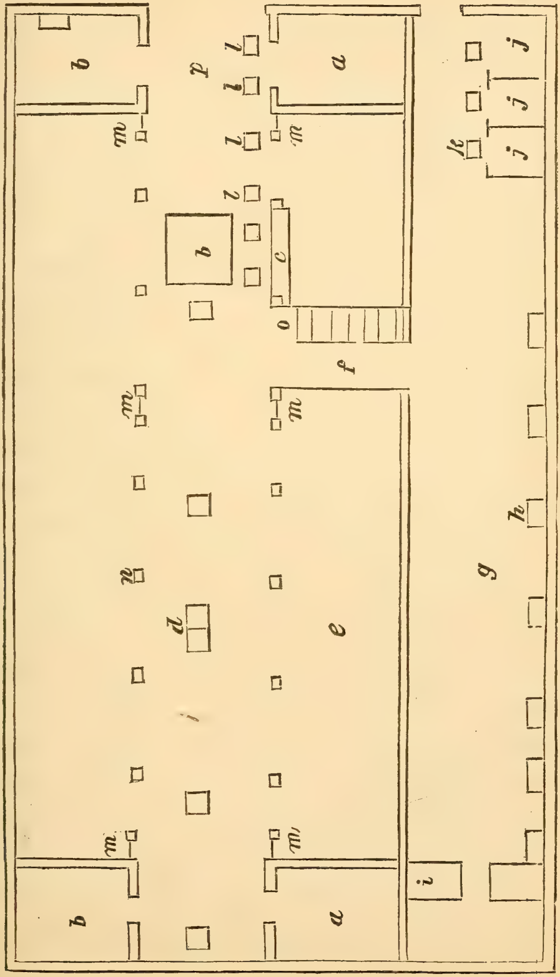
The next cut is a transverse section of the same cow-room; *a* being a walk behind the cows, five feet wide; *b*, dung-pit; *c*, cattle-stand; *d*, feeding-trough, with a bottom on a level with the platform where the cattle stand; *k*, open area, forty-three feet, by fifty-six.



TRANSVERSE SECTION.

The story above the cow-room—as represented in the next cut—is one hundred feet by forty-two; the bays for hay, ten on each side, being ten feet front and fifteen feet deep; and the open space, *p*, for the entrance of wagons, carts, etc., twelve feet wide. *b*, hay-scales. *c*, scale beam. *m m m m m m*, ladders reaching almost to the roof. *l l l*, etc., scuttle-holes for sending vegetables directly to the bins, *l l l*, etc., below. *a a b b*, rooms on the corners for storage. *d*, scuttles; four of which are used for straw, one for cut hay, and one for muck for the cellar. *n* and the other small squares are eighteen-feet posts. *f*, passage to the tool-house, a room one hundred feet long by eighteen wide. *o*, stairs leading to the scaffold in the roof of the tool-house. *i i*, benches. *g*, floor. *h*, boxes for hoes, shovels, spades, picks, iron bars, old iron, etc. *j j j*, bins for fruit. *k*, scuttles to put apples into wagons, etc., in the shed below. One side of this tool-house may be used for plows and large implements, hay-rigging, harness, etc.

Proper ventilation of the cellar and the cow-room avoids the objection that the hay is liable to injury from noxious gases.



ROOM OVER THE COW-ROOM.

The excellent manure-cellar beneath this barn extends only under the cow-room. It has a drive-way through doors on each side. No barn-cellar should be kept shut up tight, even in cold weather. The gases are constantly escaping from the manure, unless held by absorbents, which are liable not only to affect the health of the stock, but also to injure the quality of the hay. To prevent this, while securing the important advantages of a manure-cellar, the barn may be furnished with good-sized ventilators on the top, for every twenty-five feet of its length, and with wooden tubes leading from the cellar to the top.

There should also be windows on different sides of the cellar to admit the free circulation of air. With these precautions, together with the use of absorbents in the shape of loam and muck, there will be no danger of rotting the timbers of the barn, or of risking the health of the cattle or the quality of the hay.

The temperature at which the cow-room should be kept is somewhere from fifty to sixty degrees, Fahrenheit. The practice and the opinions of successful dairymen differ somewhat on this point. Too great heat would affect the health and appetite of the herd; while too low a temperature is equally objectionable, for various reasons.

The most economical plan for room in tying cattle in their stalls, is to fasten the rope or chain, whichever is used—the wooden stanchion, or stanchel, as it is called, to open and shut, enclosing the animal by the neck, being objectionable—into a ring, which is secured by a strong staple into a post. This prevents the cattle from interfering with each other, while a partition effectually prevents any contact from the animals on each side of it, in the separate stalls.

There is no greater benefit for cattle, after coming into winter-quarters, than a systematic regularity in every thing pertaining to them. Every animal should have its own particular stall in the stable, where it should always be kept. The cattle should be fed and watered at certain fixed hours of the day, as near as may be. If let out of the stables for water, unless the weather is very pleasant—when they may be permitted to lie out for a short time—they should be mmediately put back, and not allowed to range about with he outside cattle. They are more quiet and contented in heir stables than elsewhere, and waste less food than if permitted to run out; besides being in every way more omfortable, if properly bedded and attended to, as every ne will find upon trial. The habit which many farmers ave, of turning their cattle out of the stables in the morning, n all weathers—letting them range about in a cold yard, ooking and annoying each other—is of no possible benefit, nless it be to rid them of the trouble of cleaning the stables, which pays more than twice its cost in the saving of manure. The outside cattle, which occupy the yard—if there are any—are all the better that the stabled ones do not interfere with them. They become habituated to their own quarters, s do the others, and all are better for being, respectively, in heir proper places.

MILKING.

The manner of milking exerts a more powerful and lasting nfluence on the productiveness of the cow than most farmers re aware. That a slow and careless milker soon dries up he best of cows, every practical farmer and dairyman knows;

but a careful examination of the beautiful structure of the udder will serve further to explain the proper mode of milking, in order to obtain and keep up the largest yield.

The udder of a cow consists of four glands, disconnected from each other, but all contained within one bag or cellular membrane; and these glands are uniform in structure. Each gland consists of three parts: the *glandular*, or secreting part, *tubular* or conducting part, and the *teats*, or receptacle, or receiving part. The glandular forms by far the largest portion of the udder. It appears to the naked eye composed of a mass of yellowish grains; but under the microscope these grains are found to consist entirely of minute blood-vessels forming a compact plexus, or fold. These vessels secrete the milk from the blood. The milk is abstracted from the blood in the glandular part; the tubes receive and deposit it in the reservoir, or receptacle; and the sphincter at the end of the teat retains it there until it is wanted for use.

This must not be understood, however, as asserting that all the milk drawn from the udder at one milking is contained in the receptacle. The milk, as it is secreted, is conveyed to the receptacle, and when that is full, the larger tubes begin to be filled, and next the smaller ones, until the whole become gorged. When this takes place, the secretion of the milk ceases, and absorption of the thinner or more watery part commences. Now, as this absorption takes place more readily in the smaller or more distant tubes, it is invariably found that the milk from these, which comes last into the receptacle, is much thicker and richer than what was first drawn off. This milk has been significantly styled afterings, or strippings; and should this gorged state of the tubes be permitted to continue beyond a certain time, serious mischief will sometimes occur; the milk becomes too thick to flow through the tubes, and soon produces, first irritation, then inflammation, and lastly suppuration, and the function of the gland is materially impaired or altogether destroyed. Hence, the great importance of emptying these smaller tubes regularly and thoroughly, not merely to prevent the occurrence of disease, but actually to increase the quantity of milk; for, so long as the smaller tubes are kept free, milk is constantly forming; but whenever, as has already been mentioned, they become gorged, the secretion of milk ceases until they are emptied. The cow herself has no power over the sphincter at the end of her teat, so as to open it, and relieve the overcharged udder; neither has she any power of retaining the milk collected in the reservoirs when the spasm of the sphincter is overcome.

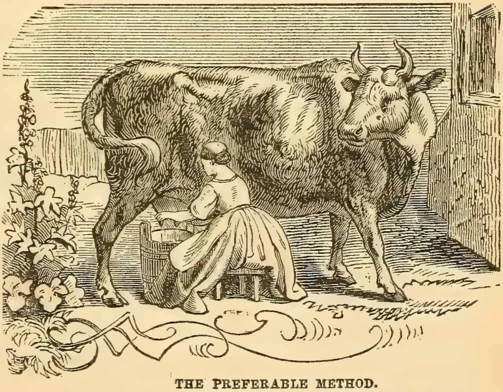
Thus is seen the necessity of drawing away the last drop of milk at every milking; and the better milker the cow, the more necessary this is. What has been said demonstrates, also, the impropriety of holding the milk in cows until the udder is distended much beyond its ordinary size, for the sake of showing its capacity for holding milk—a device to which many dealers in cows resort.

Thus much of the internal structure of the udder. Its external form requires attention, because it indicates different properties. Its form should be spheroidal, large, giving an idea of capaciousness; the bag should have a soft, fine skin, and the hind part upward toward the tail be loose and elastic. There should be fine, long hairs scattered plentifully over the surface, to keep it warm. The teats should not seem to be contracted, or funnel-shaped, at the inset with the bag. In the former state, teats are very apt to become corded, or spindled; and in the latter, too much milk will constantly be pressing on the lower tubes, or receptacle. They should drop naturally from the lower parts of the bag, being neither too short, small, or dumpy, or long, flabby, and thick, but, perhaps, about three inches in length, and so thick as just to fill the hand. They should hang as if all the quarters of the udder were equal in size, the front quarters projecting a little forward, and the hind ones a little more dependent. Each quarter should contain about equal quantities of milk; though, in the belief of some, the hind quarters contain rather the most.

Largely developed milk-veins—as the subcutaneous veins along the under part of the abdomen are commonly called—are regarded as a source of milk. This is a popular error, for the milk-vein has no connection with the udder; yet, although the office of these is to convey the blood from the fore part of the chest and sides to the inguinal vein, yet a large milk-vein certainly indicates a strongly developed vascular system—one favorable to secretions generally, and to that of the milk among the rest.

Milking is performed in two ways, stripping and handling. *Stripping* consists in seizing the teat firmly near the root between the face of the thumb and the side of the fore-finger, the length of the teat passing through the other fingers, and in milking the hand passes down the entire length of the teat, causing the milk to flow out of its point in a forcible stream. The action is renewed by again quickly elevating the hand to the root of the teat. Both hands are employed at the operation, each having hold of a different teat, and being moved alternately. The two nearest teats are commonly first milked, and then the two farthest. *Handling* is done by grasping the teat at its root with the fore-finger like a hoop, assisted by the thumb, which lies horizontally over the fore-finger, the rest being also seized by the other fingers. Milk is drawn by pressing upon the entire length of the teat in alternate jerks with the entire palm of the hand. Both hands being thus employed, are made to press alternately, but so quickly following each other that the alternate streams of milk sound to the ear like one forcible, continued stream. This continued stream is also produced by stripping. Stripping, then, is performed by pressing and passing certain fingers along the teat; handling, by the whole hand doubled, or fist, pressing the teat steadily at one place. Hence the origin of both names.

Of these two modes, handling is the preferable, since it is the more natural method—imitating, as it does, the suckling of the calf. When a calf takes a teat into its mouth, it makes the tongue and palate by which it seizes it, play upon the teat by alternate pressures or pulsations, while retaining the teat in the same position. It is thus obvious that handling is



THE PREFERABLE METHOD.

somewhat like sucking, whereas stripping is not at all like it. It is said that stripping is good for agitating the udder, the agitation of which is conducive to the withdrawal of a large quantity of milk; but there is nothing to prevent the agitation of the udder as much as the dairymaid pleases, while holding in the other mode. Indeed, a more constant vibration could be kept up in that way by the vibrations of the arms than by stripping. Stripping, by using an unconstrained pressure on two sides of the teat, is much more apt to press it unequally, than by grasping the whole teat in the palm of the hand; while the friction occasioned by passing the finger and thumb firmly over the outside of the teat, is more likely to cause heat and irritation in it than a steady and full grasp of the entire hand. To show that this friction causes an unpleasant feeling even to the dairymaid, she is obliged to lubricate the teat frequently with milk, and to wet it at first with water; whereas the other mode requires no such expedients. And as a further proof that stripping is a mode of milking which may give pain to the cow, it cannot be employed, when the teats are chapped, with so much ease to the cow as handling.

The first requisite in the person that milks is, of course, the utmost *cleanliness.* Without this, the milk is unendurable. The udder should, therefore, be carefully cleaned before the milking commences.

Milking should be done *fast,* to draw away the milk as quickly as possible, and it should be continued as long as there is a drop of milk to bring away. This is an issue which cannot be attended to in too particular a manner. If any milk is left, it is re-absorbed into the system, or else becomes caked and diminishes the tendency to secrete a full quantity afterward. Milking as dry as possible is especially necessary with young cows with their first calf; as the mode of milking and the length of time to which they can be made to hold out, will have very much to do with their milking qualities as long as they live. Old milk left in the receptacle of the teat soon changes into a curdy state, and the caseous matter not being at once removed by the next milking, is apt to irritate the lining membrane of the teat during the operation, especially when the teat is forcibly rubbed down between the finger and thumb in stripping. The consequence of this repeated irritation is the thickening of the lining membrane, which at length becomes so hardened as to close up the orifice at the end of the teat. The hardened membrane may be easily felt from the outside of the teat, when the teat is said to be *corded*. After this the teat becomes *deaf*, as it is called, and no more milk can afterward be drawn from the quarter of the udder to which the corded teat is attached.

The milking-pail is of various forms and of various materials. The Dutch use brass ones, which are brilliantly scoured every time they are in use. Tin pitchers are used in some places, while pails of wood in cooper-work are employed in others. A pail of oak, having thin staves bound together by bright iron hoops, with a handle formed by a stave projecting upward, is convenient for the purpose, and may be kept clean and sweet. One nine inches in diameter at the bottom, eleven inches at the top, and ten inches deep, with an upright handle or leg of five inches, has a capacious enough mouth to receive the milk as it descends; and a sufficient height, when standing on the edge of its bottom on the ground, to allow the dairy-maid to grasp it firmly with her knees while sitting on a small three-legged stool. Of course, such a pail cannot be milked full; but it should be large enough to contain all the milk which a single cow can give at a milking; because it is undesirable to rise from a cow before the milking is finished, or to exchange one dish for another while the milking is in progress.

The cow being a sensitive and capricious creature, is, oftentimes so easily offended that if the maid rise from her before the milk is all withdrawn, the chances are that she will not again stand quietly at that milking; or, if the vessel used in milking is taken away and another substituted in its place, before the milking is finished, the probability is that she will *hold* her milk—that is, not allow it to flow. This is a curious property which cows possess, of holding up or keeping back their milk. How it is effected has never been satisfactorily ascertained; but there is no doubt of the fact that when a cow becomes irritated, or frightened from any cause, she can withhold her milk. Of course, all cows are not affected in the same degree; but, as a proof how sensitive cows generally are, it may be mentioned that very few will be milked so freely by a stranger the first time, as by one to whom they have been accustomed.

There is one side of a cow which is usually called the *milking side*—that is the cow's left side—because, somehow, custom has established the practice of milking her from that side. It may have been adopted for two reasons: one, because we are accustomed to approach all the larger domesticated animals by what we call the *near side*—that is, the animal's left side—as being the most convenient one for ourselves; and the other reason may have been, that, as most people are right-handed, and the common use of the right hand has made it the stronger, it is most conveniently employed in milking the hinder teats of the cow, which are often most difficult to reach on account of the position of the hind legs and the length of the hinder teats, or of the breadth of the hinder part of the udder. The near side is most commonly used in this country and in Scotland; but in many parts of England the other side is preferred. Whichever side is selected, that should uniformly be used, as cows are very sensitive to changes.

In Scotland it is a rare thing to see a cow milked by any other person than a woman, though men are very commonly employed at it in this country and in England. One never sees a man milking a cow without being impressed with the idea that he is usurping an office which does not become him; and the same thought seems to be conveyed in the terms usually applied to the person connected with cows—a dairy-*maid* implying one who milks cows, as well as performs the other duties connected with the dairy—a dairy-*man* meaning one who owns a dairy. There can be but little question that the charge of this branch of the dairy should generally be entrusted to women. They are more gentle and winning than men. The same person should milk the same cow regularly, and not change from one to another, unless there are special reasons for it.

Cows are easily rendered troublesome on being milked; and the kicks and knocks which they usually receive for their restlessness, only render them more fretful. If they cannot be overcome by kindness, thumps will never make them better. The truth is, restless habits are continued in them by the treatment which they receive at first, when, most probably, they have been dragooned into submission. Their teats are tender at first; but an unfeeling, horny hand tugs at them at stripping, as if the animal had been accustomed to the operation for years. Can the creature be otherwise than uneasy? And how can she escape the wincing but by flinging out her heels?—Then hopples are placed on the hind fetlocks, to keep her heels down. The tail must then be held by some one, while the milking is going on; or the hair of its tuft be converted into a double cord, to tie the tail to the animal's leg. Add to this the many threats and scoldings uttered by the milker, and one gets a not very exaggerated impression of the "breaking-in."

Some cows, no doubt, are very unaccomodating and provoking; but, nevertheless, nothing but a rational course toward them, administered with gentleness, will ever render them less so There are cows which are troublesome to milk for a few times after calving, that become quite quiet for the remainder of the season; others will kick pertinaciously at the first milking. In this last case the safest plan—instead of hoppling, which only irritates—is for the dairy-maid to thrust her head against the flank of the cow, and while standing on her feet, stretch her hands forward, get hold of the teats the best way she can, and send the milk on the ground; and in this position it is out of the power of the cow to hurt her. These ebullitions of feeling at the first milking after calving, arise either from feeling pain in a tender state of the teat, most probably from inflammation in the lining membrane of the receptacle; or they may arise from titillation of the skin of the udder and teat, which becomes the more sensible to the affection from a heat which is wearing off.

At the age of two or three years the milking glands have not become fully developed, and their largest development will depend very greatly upon the management after the first calf. Cows should have, therefore, the most milk-producing food; be treated with constant gentleness; never struck, or spoken harshly to, but coaxed and caressed; and in ninety-nine cases out of a hundred, they will grow up gentle and quiet. The hundredth had better be fatted and sent to the butcher. Harshness is worse than useless. Be the cause of irritation what it may, one thing is certain, that gentle discipline will overcome the most turbulent temper. Nothing does so much to dry a cow up, especially a young cow, as the senseless treatment to which she is too often subjected.

The longer the young cow, with her first and second calf, is made to hold out, the more surely will this habit be fixed upon her. Stop milking her four months before the next calf, and it will be difficult to make her hold out to within four or six weeks of the time of calving afterward. Induce her, if possible, by moist and succulent food, and by careful milking, to hold out even up to the time of calving, if you desire to milk her so long, and this habit will be likely to be fixed upon her for life. But do not expect to obtain the full yield of a cow the first year after calving. Some of the very best cows are slow to develop their best qualities; and no cow reaches her prime till the age of five or six years.

The extreme importance of care and attention to these points cannot be overestimated. The wild cows grazing on the plains of South America, are said to give not more than three or four quarts a day at the height of the flow; and many an owner of large herds in Texas, it is said, has too little milk for family use, and sometimes receives his supply of butter from the New York market. There is, therefore, a constant tendency in milch cows to dry up; and it must be guarded against with special care, till the habit of yielding a large quantity, and yielding it long, becomes fixed in the young animal, when, with proper care, it may easily be kept up.

Cows, independently of their power to retain their milk in the udder, afford different degrees of pleasure in milking them, even in the quietest mood. Some yield their milk in a copious flow, with the gentlest handling that can be given them; others require great exertion to draw the milk from them even in streams no larger than a thread. The udder of the former will be found to have a soft skin and short teats; that of the latter will have a thick skin, with long rough teats. The one feels like velvet; the other is no more pleasant to the touch than untanned leather. To induce quiet and persuade the animal to give down her milk freely, it is better that she should be fed at milking-time with cut feed, or roots, placed within her easy reach.

If gentle and mild treatment is observed and persevered in, the operation of milking, as a general thing, appears to be a pleasure to the animal, as it undoubtedly is; but, if an opposite course is pursued—if at every restless movement, caused, perhaps, by pressing a sore teat, the animal is harshly spoken to—she will be likely to learn to kick as a habit, and it will be difficult to overcome it ever afterward.

Whatever may be the practice on other occasions, there can be no doubt that, for some weeks after calving, and in the height of the flow, cows ought, if possible, to be milked regularly three times a day—at early morning, noon, and night. Every practical dairyman knows that cows thus milked give a larger quantity of milk than if milked only twice, though it may not be quite so rich; and in young cows, no doubt, it has a tendency to promote the development of the udder and milk-veins. A frequent milking stimulates an increased secretion, therefore, and ought never to be neglected in the milk-dairy, either in the case of young cows, or very large milkers, at the height of the flow, which will commonly be for two or three months after calving.

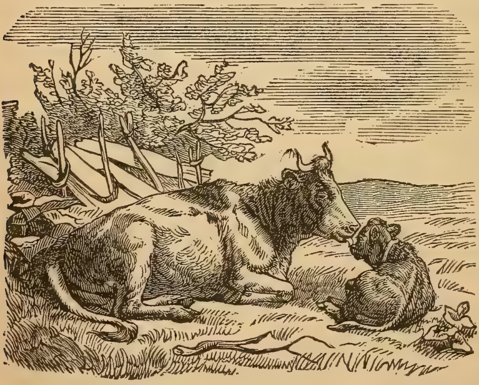
There being a great difference in the quality as well as in the quantity of the milk of different cows, no dairyman should neglect to test the milk of each new addition to his dairy stock, whether it be an animal of his own raising or one brought from abroad. A lactometer—or instrument for testing the comparative richness of different species of milk—is very convenient for this purpose; but any one can set the milk of each cow separately at first, and give it a thorough trial, when the difference will be found to be great. Economy will dictate that the cows least to the purpose should be disposed of, and their places supplied with better ones.

THE RAISING OF CALVES.

It has been found in practice that calves properly bred and raised on the farm have a far greater intrinsic value for that farm, other things being equal, than any that can be procured elsewhere; while on the manner in which they are raised will depend much of their future usefulness and profit.

These considerations should have their proper weight in deciding whether a promising calf from a good cow and bull shall be kept, or sold to the butcher. But, rather than raise a calf at hap-hazard, and simply because its dam was celebrated as a milker, the judicious farmer will prefer to judge of the peculiar characteristics of the animal itself. This will often save the great and useless outlay which has sometimes been incurred in raising calves for dairy purposes, which a more careful examination would have rejected as unpromising.

The method of judging stock which has been recommended in the previous pages is of practical utility here, and it is safer to rely upon it to some extent, particularly when other appearances concur, than to go on blindly. The milk-mirror on the calf is, indeed, small, but no smaller in proportion to its size than that of the cow; while its shape and form can generally be distinctly seen, particularly at the end of ten or twelve weeks. The development of the udder, and other peculiarities, will give some indication of the future capacities of the animal, and these should be carefully studied. If we except the manure of young stock, the calf is the first product of the cow, and as such demands our attention, whether it is to be



MATERNAL AFFECTION.

raised or hurried off to the shambles. The practice adopted in raising calves differs widely in different sections of the country, being governed very much by local circumstances, as the vicinity of a milk-market, the value of milk for the dairy, the object of breeding, whether mainly for beef, for work, or for the dairy, etc.; but, in general, it may be said, that, within the range of thirty or forty miles of good veal-markets, which large towns furnish, comparatively few are raised at all. Most of them are fattened and sold at ages varying from three to eight or ten weeks; and in milk-dairies still nearer large towns and cities they are often hurried off at one or two days, or, at most, a week old. In both of these cases, as long as the calf is kept it is generally allowed to suck the cow, and, as the treatment is very simple, there is nothing which particularly calls for remark, unless it be to condemn the practice entirely, upon the ground that there is a more profitable way of fattening calves for the butcher, and to say that allowing the calf to suck the cow at all is objectionable on the score of economy, except in cases where it is rendered necessary by the hard and swollen condition of the udder.

If the calf is so soon to be taken away, it is better that the cow should not be suffered to become attached to it at all; since she is inclined to withhold her milk when it is removed, and thus a loss is sustained. The farmer will be governed by the question of profit, whatever course it is decided to adopt. In raising blood-stock, however, or in raising beef cattle, without any regard to economy of milk, the system of suckling the calves, or letting them run with the cow, may and will be adopted, since it is usually attended with somewhat less labor.

The other course, which is regarded as the best where the calf is to be raised for the dairy, is to bring it up by hand. This is almost universally done in all countries where the raising of dairy cows is best understood—in Switzerland, Holland, some parts of Germany, and England. It requires rather more care, on the whole; but it is decidedly preferable, since the calves cost less, as the food can be easily modified, and the growth is not checked, as is usually the case when the calf is taken off from the cow. Allusion is here made, of course, to sections where the milk of the cow is of some account for the dairy, and where it is too valuable to be devoted entirely to nourishing the calf. In this case, as soon as the calf is dropped the cow is allowed to lick off the slimy moisture till it is dry, which she will generally do from instinct, or, if not, a slight sprinkling of salt over the body of the calf will immediately tempt her. The calf is left to suck once or twice, which it will do as soon as it is able to stand. It should, in all cases, be permitted to have the first milk which comes from the cow, which is of a turbid, yellowish color, unfit for any of the purposes of the dairy, but somewhat purgative and medicinal, and admirably and wisely designed by Nature to free the bowels and intestines of the new-born animal from the mucous, excrementitious matter always existing in it after birth. Too much of this new milk may, however, be hurtful even to the new-born calf, while it should never be given at all to older calves. The best course would seem to be—and such is in accordance with the experience of the most successful stock-raisers—to milk the cow dry immediately after the calf has sucked once, especially if the udder is painfully distended, which is often the case, and to leave the calf with the cow during one day, and after that to feed it by putting the fingers into its mouth, and gently bringing its muzzle down to the milk in a pail or trough, when it will imbibe in sucking the fingers. No great difficulty will be experienced in teaching the calf to drink when taken so young, though some take to it much more readily than others. What the calf does not need should be given to the cow. Some, however, prefer to milk immediately after calving; and, if the udder is overloaded, this may be the best course, though the better practice appears to be, to leave the cow as quietly to herself as possible for a few hours. The less she is disturbed, as a general thing, the better. The after-birth should be taken from her immediately after it is dropped. It is customary to give the cow, as soon as convenient after calving, some warm and stimulating drink—a little meal stirred into warm water, with a part of the first milk which comes from her, seasoned with a little salt.

In many cases the calf is taken from the cow immediately; and before she has seen it, to a warm, dry pen out of her sight, and there rubbed till it is thoroughly dry; and then, when able to stand, fed with the new milk from the cow, which it should have three or four times a day, regularly, for the first fortnight, whatever course it is proposed to adopt afterwards. It is of the greatest importance to give the young calf a thrifty start. The milk, unless coming directly from the cow, should be warmed.

Some object to removing the calf from the cow in this way, on the ground of its apparent cruelty. But the objection to letting the calf suck the cow for several days, as they do, or indeed of leaving it with the cow for any length of time, is, that she invariably becomes attached to it, and frets and withholds her milk when it is at last taken from her. She probably suffers much more, after this attachment is once formed, at the removal of the object of it, than she does at its being taken at first out of her sight. The cow's memory is far more retentive than many suppose; and the loss and injury sustained by removing the calf after it has been allowed to suck her for a longer or shorter period are never known exactly, because it is not usually known how much milk the calf takes; but it is, without doubt, very considerable. If the udder is all right, there seems to be no good reason for leaving the calf with the cow for two or three days, if it is then to be taken away.

The practice in Holland is to remove the calf from its mother even before it has been licked, and to take it into a corner of the barn, or into another building, out of the cow's sight and hearing, put it on soft, dry straw, and rub it dry with some hay or straw, when its tongue and gums are slightly rubbed with salt, and the mucus and saliva removed from the nostrils and lips. After this has been done, the calf is made to drink the milk first taken as it comes from the mother. It is slightly diluted with water, if taken last from the udder; but, if the first of the milking, it is given just as it is. The calf is taught to drink in the same manner as in this country, by putting the fingers in its mouth, and bringing it down to the milk, and it soon gets so as to drink unaided It is fed, at first, from four to six times a day, or even oftener; but soon only three times, at regular intervals. Its food for two or three weeks is clear milk, as it comes warm and fresh from the cow. This is never omitted, as the milk during most of that time possesses certain qualities which are necessary to the calf, and which cannot be effectually supplied by any other food. In the third or fourth week the milk is skimmed, but warmed to the degree of fresh milk; though, as the calf grows a little older, the milk is given cold, while less care is taken to give it the milk of its own mother, that of other cows now answering equally well. In some places, calves are fed on buttermilk at the age of two weeks and after; but the change from new milk, fresh from the cow, is made gradually, some sweet skimmed milk and warm water being first added to it.

At three weeks old, or thereabouts, the calf will begin to eat a little sweet, fine hay, and potatoes cut fine, and it very soon becomes accustomed to this food. Many now begin to give linseed-meal mixed into hot water, to which is added some skim-milk or buttermilk; and others use a little bran cooked in hay-tea, made by chopping the hay fine and pouring on boiling-hot water, which is allowed to stand awhile on it. An egg is frequently broken into such a mixture. Others still take pains at this age to have fresh linseed-cake, broken into pieces of the size of a pigeon's egg; putting one of these into the mouth after the meal of milk has been finished, and when it is eager to suck at any thing in its way. It will very soon learn to eat linseed-meal. A little sweet clover is put in its way at the age of about three weeks, and it will soon begin to eat that also.

In this manner the feeding is continued from the fourth to the seventh week, the quantity of solid food being gradually increased. In the sixth or seventh week the milk is by degrees withheld, and water or buttermilk used instead; and soon after this, green food may be safely given, increasing it gradually with the hay to the age of ten or twelve weeks, when it will do to put them upon grass alone, if the season is favorable. A lot as near the house as possible, where they can be easily looked after and frequently visited, is the best. Calves should be gradually accustomed to all changes; and even after having been turned out to pasture, they ought to be put under shelter if the weather is not dry and warm. The want of care and attention relative to these little details will be apparent sooner or later; while, if the farmer gives his personal attention to these matters, he will be fully paid in the rapid growth of his calves. It is especially necessary to see that the troughs from which they are fed, if troughs are used, are kept clean and sweet.

But there are some—even among intelligent farmers—who make a practice of turning their calves out to pasture at the tender age of two or three weeks—and that, too, when they have sucked the cow up to that time—and allow them nothing in the shape of milk and tender care. This, certainly, is the poorest possible economy, to say nothing of the manifest cruelty of such treatment. The growth of the calf is checked, and the system receives a shock from so sudden a change, from which it cannot soon recover. The careful Dutch breeders bring the calves either skimmed milk or buttermilk to drink several times a day after they are turned to grass, which is not till the age of ten or twelve weeks; and, if the weather is chilly, the milk is warmed for them.

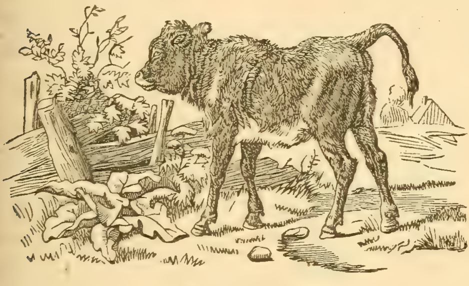
They put a trough generally under a covering, to which the calves may come and drink at regular times. Thus, they are kept tame and docile.

In the raising of calves, through all stages of their growth, great care should be taken neither to starve nor to over-feed. A calf should never be surfeited, and never be fed so highly that it cannot be fed more highly as it advances. The most important part is to keep it growing thriftily without getting too fat, if it is to be raised for the dairy.

The calves in the dairy districts of Scotland are fed on the milk, with seldom any admixture; and they are not permitted to suck their dams, but are taught to drink milk by the hand from a dish. They are generally fed on milk only for the first four, five, or six weeks, and are then allowed from two to two and a half quarts of new milk each meal, twice in the twenty-four hours. Some never give them any other food when young except milk, lessening the quantity when the calf begins to eat grass or other food, which it generally does when about five weeks old, if grass can be had; and withdrawing it entirely about the seventh or eighth week of the calf's age. But, if the calf is reared in winter, or early in spring, before the grass rises, it must be supplied with at least some milk until it is eight or nine weeks old, as a calf will not so soon learn to eat hay or straw, nor fare so well on them alone as it will on pasture. Some feed their calves reared for stock partly with meal mixed in the milk after the third or fourth week. Others introduce gradually some new whey into the milk, first mixed with meal; and, when the calf gets older, they withdraw the milk, and feed it on whey and porridge. Hay-tea, juices of peas and beans, or pea or bean-straw, linseed beaten into powder, treacle, etc., have all been sometimes used to advantage in feeding calves; but milk, when it can be spared, is, in the judgment of the Scotch breeders, by far their most natural food.

In Galloway, and other pastoral districts, where the calves are allowed to suck, the people are so much wedded to their own customs as to argue that suckling is much more nutritious to the calves than any other mode of feeding. That it induces a greater secretion of saliva, which, by promoting digestion, accelerates the growth and fattening of the young animal, cannot be doubted; but the secretion of that fluid may likewise be promoted by placing an artificial teat in the mouth of the calf, and giving it the milk slowly, and at the natural temperature. In the dairy districts of Scotland, the dairymaid puts one of her fingers into the mouth of the calf when it is fed, which serves the purpose of a teat, and will have nearly the same effect as the natural teat in inducing the secretion of saliva. If that, or an artificial teat of leather, be used, and the milk be given slowly before it is cold, the secretion of saliva may be promoted to all the extent that can be necessary; besides, secretion is not confined to the mere period of eating, but, as in the human body, the saliva is formed and part of it swallowed at all times. As part of the saliva is sometimes seen dropping from the mouths of the calves, it might be advisable not only to give them an artificial teat when fed, but to place, as is frequently done, a lump of chalk before them to lick, thus leading them to swallow the saliva. The chalk would so far supply the want of salt, of which cattle are often so improperly deprived, and it would also promote the formation of saliva. Indeed, calves are very much disposed to lick and suck every thing which comes within their reach, which seems to be the way in which Nature teaches them to supply their stomachs with saliva.

But though sucking their dams may be most advantageous in that respect, yet it has also some disadvantages. The cow is always more injured than the calf is benefited by that mode of feeding. She becomes so fond of the calf that she does not, for a long time after, yield her milk freely to the dairyman. The calf does not when young draw off the milk completely, and when it is taken off by the hand, the cow withholds a part of her milk, and, whenever a cow's udder is not completely emptied every time she is milked, the lactic secretion—as before stated—is thereby diminished.



FROLICKSOME.

Feeding of calves by hand is also, in various respects, advantageous. Instead of depending on the uncertain, or perhaps precarious supply of the dam, which may be more at first than the young animal can consume or digest, and at other times too little for its supply, its food can, by hand-feeding, be regulated to suit the age, appetite, and the purposes for which the calf is intended; other admixtures or substitutes can be introduced into the milk, and the quantity gradually increased or withdrawn at pleasure. This is highly necessary when the calves are reared for stock. The milk is in that case diminished, and other food introduced so gradually that the stomach of the young animal is not injured as it is when the food is too suddenly changed. And, in the case of feeding calves for the butcher, the quantity of milk is not limited to that of the dam—for no cow will allow a stranger-calf to suck her—but it can be increased, or the richest or poorest parts of the milk given at pleasure.

Such are, substantially, the views upon this subject which are entertained by the most judicious farmers in the first dairy districts of Scotland.

In those districts—where, probably, the feeding and management of calves are as well and as judiciously conducted as in any other part of Great Britain—the farmers' wives and daughters, or the female domestics, have the principal charge of young calves; and they are, doubtless, much better calculated for this duty than men, since they are more inclined to be gentle and patient. The utmost gentleness—as has been already remarked, in another connection—should always be observed in the treatment of all stock; but especially of milch cows, and calves designed for the dairy. Persevering kindness and patience, will, almost invariably, overcome the most obstinate natures; while rough and ungentle handling will be repaid in a quiet kind of way, perhaps, by withholding the milk, which will always have a tendency to dry up the cow; or, what is nearly as bad, by kicking and other modes of revenge, which often contribute to the personal discomfort of the milker. The disposition of the cow is greatly modified, if not, indeed, wholly formed, by her treatment while young; and therefore it is best to handle calves as much as possible, and make pets of them, lead them with a halter, and caress them in various ways. Calves managed in this way will always be docile, and suffer themselves to be approached and handled, both in the pasture and in the barn.

With respect to the use of hay-tea—often used in this country, but more common abroad, where greater care and attention are usually bestowed upon the details of breeding—Youatt says: "At the end of three or four days, or perhaps a week, or near a fortnight, after a calf has been dropped, and the first passages have been cleansed by allowing it to drink as much of the cow's milk as it feels inclined for, let the quantity usually allotted for a meal be mixed, consisting, for the first week, of three parts of milk and one part of hay-tea. *The only nourishing infusion of hay is that which is made from the best and sweetest hay, cut by a chaff-cutter into pieces about two inches long,* and put into an earthen vessel; over this, boiling water should be poured, and the whole allowed to stand for two hours, during which time it ought to be kept carefully closed. After the first week, the proportions of milk and hay-tea may be equal; then composed of two-thirds of hay-tea and one of milk; and at length, one-fourth part of milk will be sufficient. This food should be given to the calf in a lukewarm state *at least three, if not four times a day, in quantities averaging three quarts at a meal,* but gradually increasing to four quarts as the calf grows older. Toward the end of the second month, beside the usual quantity given at each meal—composed of three parts of the infusion and one of milk—a small wisp or bundle of hay is to be laid before the calf, which will gradually come to eat it; but, if the weather is favorable, as in the month of

May, the beast may be turned out to graze in a fine, sweet pasture, well sheltered from the wind and sun. This diet may be continued until toward the latter end of the third month, when, if the calf grazes heartily, each meal may be reduced to less than a quart of milk, with hay-water; or skimmed milk, or fresh buttermilk, may be substituted for new milk. At the expiration of the third month, the animal will hardly require to be fed by hand; though, if this should still be necessary, one quart of the infusion given daily—which, during the summer, need not be warmed—will suffice." The hay-tea should be made fresh every two days, as it soon loses its nutritious quality.

This and other preparations are given, not because they are better than milk,—than which nothing is better adapted to fatten a calf, or promote its growth,—but simply to economize by providing the simplest and cheapest substitutes. Experience shows that the first two or three calves are smaller than those which follow; and hence, unless they are pure-bred, and to be kept for the blood, they are not generally thought to be so desirable to raise for the dairy as the third or fourth, and those that come after, up to the age of nine or ten years. Opinions upon this point, however, differ.

According to the comparative experiments of a German agriculturist, cows which as calves had been allowed to suck their dams from two to four weeks, brought calves which weighed only from thirty-five to forty-eight pounds; while others, which as calves had been allowed to suck from five to eight weeks, brought calves which weighed from sixty to eighty pounds. It is difficult to see how there can be so great a difference, if, indeed, there be any; but it may be worthy of careful observation and experiment, and as such it is stated here. The increased size of the calf would be due to the increased size to which the cow would attain; and if as a calf she were allowed to run in the pasture with her dam for four or five months, taking all the milk she wanted, she would doubtless be kept growing on in a thriving condition. But taking a calf from the cow at four or even eight weeks must check its growth to some extent; and this may be avoided by feeding liberally, and bringing up by hand.

After the calf is fully weaned, there is nothing very peculiar in the general management. A young animal will require for the first few months—say up to the age of six months—an average of five or six pounds daily of good hay, or its equivalent. At the age of six months, it will require from four and a half to five pounds; and at the end of the year, from three and a half or four pounds of good hay, or its equivalent, for every one hundred pounds of its live weight; or, in other words, about three and a half or four per cent. of its live weight. At two years old, it will require three and a half, and some months later, three per cent. of its live weight daily in good hay, or its equivalent. Indian-corn fodder, either green or cured, forms an excellent and wholesome food at this age.

The heifer should not be pampered, nor yet poorly fed or half starved, so as to receive a check in her growth. An abundant supply of good healthy dairy food and milk will do all that is necessary up to the time of her having her first calf—which should not ordinarily be till the age of three years, though some choose to allow them to come in at two, or a little over, on the ground that it early stimulates the secretion of milk, and that this will increase the milking propensity through life. This is undoubtedly the case, as a general rule; but greater injury is at the same time done by checking the growth, unless the heifer has been fed up to large size and full development from the start—in which case she may perhaps take the bull at fifteen or eighteen months without injury. Even if a heifer comes in at two years, it is generally deemed desirable to let her run barren for the following year, which will promote her growth and more perfect development.

The feeding which young stock often get is not such as is calculated to make good-sized or valuable cattle of them. They are often fed on the poorest of hay or straw through the winter, not infrequently left exposed to cold, unprotected and unhoused, and thus stinted in their growth. This is, surely, the very worst economy, or rather it is no economy at all. Properly viewed, it is an extravagant wastefulness which no farmer can afford. No animal develops its good points under such treatment; and if the starving system is to be followed at all, it had better be after the age of two or three years, when the animal's constitution has attained the strength and vigor which may, possibly, enable it to resist ill treatment.

To raise up first-rate milkers, it is absolutely necessary to feed on dairy food even when they are young. No matter how fine the breed is, if the calf is raised on poor, short feed, it will never be so good a milker as if raised on better keeping; and hence, in dairy districts, where calves are raised at all, they ought to be allowed the best pasture during the summer, and good, sweet and wholesome food during the winter.

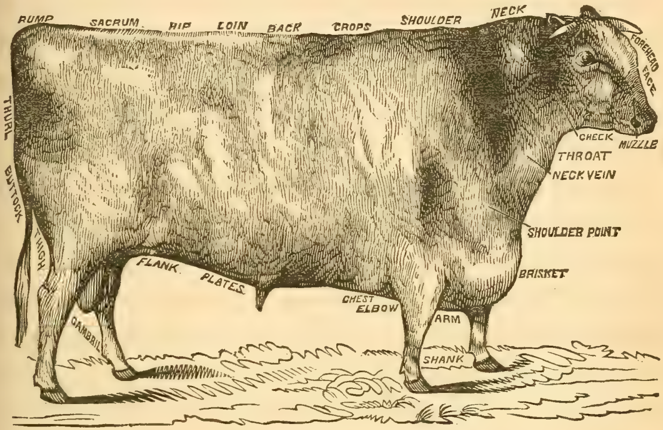
POINTS OF FAT CATTLE.

Whatever theoretical objections may be raised against over-fed cattle, and great as may be the attempts to disparage the mountains of fat,—as highly-fed cattle are sometimes designated,—there is no doubt of the practical fact, that the best butcher cannot sell any thing but the best fatted beef; and of whatever age, size, or shape a half-fatted ox may be, he is never selected by judges as fit for human food. Hence, a well-fatted animal always commands a better price per pound than one imperfectly fed, and the parts selected as the primest beef are precisely the parts which contain the largest deposits of fat. The rump, the crop, and the sirloin, the very favorite cuts,—which always command from twenty to twenty-five per cent. more than any other part of the ox,—are just those parts on which the largest quantities of fat are found; so that, instead of the taste and fashion of the age being against the excessive fattening of animals, the fact is, practically, exactly the reverse. Where there is the most fat, there is the best lean; where there is the greatest amount of muscle, without its share of fat, that part is accounted inferior, and is used for a different purpose; in fact, so far from fat's being a disease, it is a condition of muscle, necessary to its utility as food,—a source of luxury to the rich, and of comfort to the poor, furnishing a nourishing and healthy diet for their families.

Fattening is a secretive power which grazing animals possess, enabling them to lay by a store of the superfluous food which they take for seasons of cold or scarcity. It collects round the angular bones of the animal, and gives the appearance of rotundity; hence the tendency to deposit fat is indicated, as has been stated, by a *roundness* of form, as opposed to the *fatness* of a milk-secreting animal. But its greatest use is, that it is a store of heat-producing aliment, laid up for seasons of scarcity and want. The food of animals, for the most part, may be said to consist of a saccharine, an oleaginous, and an albuminous principle. To the first belong all the starchy, saccharine, and gummy parts of the plants, which undergo changes in the digestive organs similar to fermentation before they can be assimilated in the system; by them also animal heat is sustained. In indolent animals, the oily parts of plants are deposited and laid up as fat; and, when vigor and strength fail, this is taken up and also used in breathing to supply the place of the consumed saccharine matter. The albuminous, or gelatinous principle of plants is mainly useful in forming muscle; while the ashes of plants, the unconsumable parts, are for the supply, mainly, of bone, hair, and horn, but also of muscle and of blood, and to supply the waste which continually goes on.

Now, there are several qualities which are essentially characteristic of a disposition to fatten. There have not, as yet, been any book-rules laid down, as in the case of M. Guénon's indications of milking-cows; but there are, nevertheless, marks so definite and well understood, that they are comprehended and acted upon by every grazier, although they are by no means easy to describe. It is by skillful acumen that the grazier acquires his knowledge, and not by theoretical rules; observation, judgment, and experience, powerful perceptive faculties, and a keen and minute comparison and discrimination, are essential to his success.

The first indication upon which he relies, is the *touch*. It is the absolute criterion of *quality*, which is supposed to be the keystone of perfection in all animals, whether for the pail or the butcher. The skin is so intimately connected with the internal organs, in all animals, that it is questionable whether even our schools of medicine might not make more use of it in a diagnosis of disease. Of physiological tendencies in cattle, however, it is of the last and most vital importance. It must neither be thick, nor hard, nor adhere firmly to the muscles. If it is so, the animal is a hard grazer, a difficult and obstinate feeder—no skillful man will purchase it—such a creature must go to a novice, and even to him at a price so low as to tempt him to become a purchaser. On the other hand, the skin must not be thin, like paper, nor flaccid, nor loose in the hand, nor flabby.



POINTS OF CATTLE.

This is the opposite extreme, and is indicative of delicateness, bad, flabby flesh, and, possibly, of inaptitude to retain the fat. It must be *elastic* and velvety, soft and pliable, presenting to the touch a gentle resistance, but so delicate as to give pleasure to the sensitive hand—a skin, in short, which seems at first to give an indentation from the pressure of the fingers, but which again rises to its place by a gentle elasticity.

The *hair* is of nearly as much importance as the skin. A hard skin will have straight and stiff hair; it will not have a curl, but be thinly and lankly distributed equally over the surface. A proper grazing animal will have a *mossy* coat, not absolutely curled, but having a disposition to a graceful curl, a semifold, which presents a waving inequality; but as different from a close and straightly-laid coat, as it is from one standing off the animal at right angles, a strong symptom of disease. It will also, in a thriving animal, be licked here and there with its tongue, a proof that the skin is duly performing its functions.

There must be, also, the full and goggle *eye*, bright and pressed outward by the fatty bed below; because, as this is a part where Nature always provides fat, an animal capable of developing it to any considerable extent, will have its indications here, at least, when it exists in excess.

So much for feeding qualities in the animal, and their conformations indicative of this kindly disposition. Next come such formations of the animal itself as are favorable to the growth of fat, other things being equal. There must be *size* where large weights are expected. Christmas beef, for instance, is expected to be large as well as fat. The symbol of festivity should be capacious, as well as prime in quality. But it is so much a matter of choice and circumstance with the grazier, that profit alone will be his guide. The axiom will be, however, as a general rule, that the better the grazing soil the larger the animal may be; the poorer the soil, the smaller the animal. Small animals are, unquestionably, much more easily fed, and they are well known by experienced men to be best adapted to second-rate feeding pastures.

But, beyond this, there must be *breadth* of carcass. This is indicative of fattening, perhaps, beyond all other qualifications. If rumps are favorite joints and produce the best price, it is best to have the animal which will grow the longest, the broadest, and the best rump; the same of crop, and the same of sirloin; and not only so, but breadth is essential to the consumption of that quantity of food which is necessary to the development of a large amount of fat in the animal. Thus, a deep, wide chest, favorable for the respiratory and circulating functions, enables it to consume a large amount of food, to take up the sugary matter, and to deposit the fatty matter,—as then useless for respiration, but afterwards to be prized. A full level crop will be of the same physiological utility; while a broad and open framework at the hips will afford scope for the action of the liver and kidneys.

There are other points, also, of much importance; the head must be small and fine; its special use is indicative of the quick fattening of the animal so constructed, and it is also indicative of the bones being small and the legs short. For constitutional powers, the beast should have his ribs extended well towards the thigh-bones or hips, so as to leave as little unprotected space as possible. There must be no angular or abrupt points; all must be round, and broad, and parallel. Any depression in the lean animal will give a deficient deposit of flesh and fat at that point, when sold to the butcher, and thus deteriorate its value; and hence the animal must be round and full.

But either fancy, or accident, or skill—it is unnecessary to decide which—has associated *symmetry* with quality and conformation, as a point of great importance in animals calculated for fattening; and there is no doubt that, to a certain extent, this is so. The beast must be a system of mathematical lines. To the advocate of symmetry, the setting-on of a tail will be a condemning fault; indeed the ridge of the back, like a straight line, with the outline of the belly exactly parallel, viewed from the side, and a depth and squareness when viewed from behind,—which remind us of a geometrical cube, rather than a vital economy,—may be said to be the indications of excellence in a fat ox. The points of excellence in such an animal are outlined under the subsequent head, as developed in the cutting up after slaughter.

Now, these qualities are inherent in some breeds; there may be cases and instances in all the superior breeds, and in most there may be failures.

DRIVING AND SLAUGHTERING.

It is necessary that cattle which have been disposed of to the dealer or butcher, or which are intended to be driven to market, should undergo a preparation for the journey. If they were immediately put to the road to travel, from feeding on grass or turnips, when their bowels are full of undigested vegetable matter, a scouring might ensue which would render them unfit to pursue their journey; and this complaint is the more likely to be brought on from the strong propensity which cattle have to take violent exercise upon feeling themselves at liberty after a long confinement. They, in fact, become light-headed whenever they leave the barn or enclosure, so much so that they actually "frisk and race and leap," and their antics would be highly amusing, were it not for the apprehension that they may hurt themselves against some opposing object, as they seem to regard nothing before them.

On being let out for the first time, cattle should be put for awhile into a larger court, or on a road well fenced with enclosures, and guarded by men, to romp about. Two or three such allowances of liberty will render them quiet; and, in the mean time, to lighten their weight of carcass, they should have hay for a large proportion of their food. These precautions are absolutely necessary for cattle which have been confined in barns; otherwise, accidents may befall them on the road, where they will at once break loose. Even at home serious accidents sometimes overtake them, such as the breaking down of a horn, casting off a hoof, spraining a tendon, bruising ribs, and heating the whole body violently; and, of course, when any such ill luck befalls, the animal affected must be left behind, and become a drawback upon the value of the rest, unless kept for some time longer.

Having the cattle prepared for travel, the drover takes the road very slowly for the first two days, not exceeding seven or eight miles a day. At night, in winter, they should be put into an open court, and supplied with hay, water, and a very few turnips; for, if roots are suddenly withdrawn from them,—since it is taken for granted that these have formed a staple portion of their food,—their bellies will become shrunken up into smaller dimensions—a state very much against a favorable appearance in market. After the first two days they may proceed faster, say twelve or thirteen miles a day, if very fat; and fifteen, if moderately so. When the journey is long and the beasts get faint from travel, they should have corn to support them. In frosty weather, when the roads become very hard, they are apt to become shoulder-shaken, an effect of founder; and if sleet falls during the day, and becomes frozen upon them at night, they may become so chilled as to refuse food, and shrink rapidly away. Cattle should, if possible, arrive the day before in the neighborhood of a distant market, and be supplied with a good feed of roots and hay, or grass, to make them look fresh and fill them up again; but if the market is at but short distance, they can travel to it early in the morning.

A FRONTISPIECE.

In driving cattle the drover should have no dog, which will only annoy them. He should walk either before or behind, as he sees them disposed to proceed too fast or to loiter upon the road; and in passing carriages, the leading ox, after a little experience, will make way for the rest to follow. On putting oxen on a ferry-boat the shipping of the first one only is attended with much trouble. A man on each side should take hold of a horn, or of a halter made of any piece of rope, should the beast be hornless, and two other men, one on each side, should push him up behind with a piece of rope held between them as a breeching, and conduct him along the plank into the boat; if it have low gunwales, a man will be required to remain beside him until one or two more of the cattle follow their companion, which they will most readily do. From neglecting this precaution in small ferry-boats, the first beast sometimes leaps into the water, when it becomes a difficult task to prevent some of the rest doing the same thing.

Whatever time a lot of cattle may take to go to a market, they should never be *overdriven*. There is great difference of management in this respect among drovers. Some like to proceed upon the road quietly, slowly, but surely, and to reach the market in a placid, cool state. Others, again, drive smartly along for some distance, and then rest to cool awhile, when the beasts will probably get chilled and have a staring coat when they reach their destination; while others like to enter the market with their beasts in an excited state, imagining that they then look gay; but distended nostrils, loose bowels, and reeking bodies are no recommendations to a purchaser. Good judges are shy of purchasing cattle in a heated state, because they do not know how long they may have been in it; and to cover any risk, will give at least five dollars a head below what they would have offered for them in a cool state. Some drovers have a habit of thumping at the hindmost beast of the lot with a stick while on the road. This is a censurable practice, as the flesh, where it is thumped, will bear a red mark after the animal has been slaughtered,—the mark receiving the appropriate name of *blood-burn*,—and the flesh thus affected will not take on salt, and is apt to putrefy. A touch up on the shank, or any tendonous part, when correction is necessary, is all that is required; but the voice, in most cases, will answer as well. The flesh of overdriven cattle, when slaughtered, never becomes properly firm, and their tallow has a soft, melted appearance.

A few large oxen in one lot look best in a market on a position rather above the eye of a spectator. When a large lot is nearly alike in size and appearance, they look best and most level on a flat piece of ground. Very large fat oxen never look better than on ground on the same level with the spectator. An ox, to look well, should hold his head on a line with the body, with lively ears, clear eye, dewy nose, a well-licked hide, and should stand firmly on the ground on all his feet. These are all symptoms of high health and good condition. Whenever an ox shifts his standing from one foot to another, he is *foot-sore*, and has been driven far. Whenever his head hangs down and his eyes water, he feels ill at ease inwardly. When his coat stares, he has been overheated some time, and has got a subsequent *chill*. All these latter symptoms will be much aggravated in cattle that have been fed in a barn.

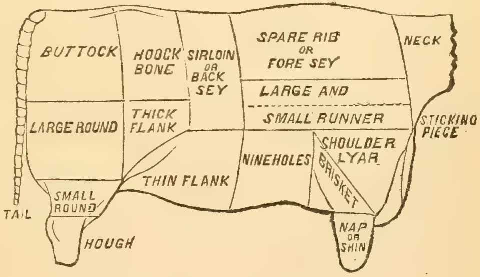
Cattle are made to fast before being slaughtered. The time they should stand depends upon their state on their arrival at the shambles. If they have been driven a considerable distance in a proper manner, the bowels will be in a tolerably empty state, so that twelve hours may suffice;

but if they are full and just off their food, twenty-four hours will be required. Beasts that have been overdriven, or much struck with sticks, or in any degree infuriated, should not be immediately slaughtered, but allowed to stand on dry food, such as hay, until the symptoms disappear. These precautions are absolutely necessary that the meat may be preserved in the best state.

The mode of slaughtering cattle varies in different countries. In the great slaughter-houses at Montmartre, in Paris, they are slaughtered by bisecting the spinal cord of the cerical vertebræ; and this is accomplished by the driving of a sharp-pointed chisel between the second and third vertebræ, with a smart stroke of a mallet, while the animal is standing, when it drops, and death or insensibility instantly ensues, and the blood is let out immediately by opening the blood-vessels of the neck. The plan adopted in England is, first to bring the ox down on his knees, and place his under-jaw upon the ground by means of ropes fastened to his head and passed through an iron ring in the floor of the slaughter-house. He is then stunned with a few blows from an iron axe made for the purpose, on the forehead, the bone of which is usually driven into the brain. The animal then falls upon his side, and the blood is let out by the neck. Of the two modes, the French is apparently the less cruel, for some oxen require many blows to make them fall. Some butchers, however, allege that the separation of the spinal cord, by producing a general nervous convulsion throughout the body, prevents the blood from flowing as rapidly and entirely out of it as when the ox is stunned in the forehead. The skin is then taken off to the knees, when the legs are disjointed, and also off the head. The carcass is then hung up by the tendons of the hough on a stretcher, by a block and tackle, worked by a small winch, which retains in place what rope it winds up by means of a wheel and ratchet.

After the carcass has hung for twenty-four hours, it should be cut down by the back-bone, or chine, into two *sides.* This is done either with the saw, or chopper; the saw making the neatest job in the hands of an inexperienced butcher, though it is the most laborious; and with the chopper is the quickest, but by no means the neatest plan, especially in the hands of a careless workman. In London, the chine is equally divided between both sides; while in Scotland, one side of a carcass of beef has a great deal more bone than the other, all the spinous processes of the vertebræ being left upon it. The bony is called the *lying* side of the meat. In London, the divided processes in the fore-quarters are broken in the middle when warm, and chopped back with the flat side of the chopper, which has the effect of thickening the fore and middle ribs considerably when cut up. The London butcher also cuts the joints above the hind knee, and, by making some incisions with a sharp knife, cuts the tendons there, and drops the flesh of the hind-quarter on the flank and loins, which causes it to cut up thicker than in the Scotch mode. In opening the hind-quarter he also cuts the aitch bone, or pelvis through the centre, which makes the rump look better. Some butchers in the north of England score the fat of the *closing* of the hind-quarter, which has the effect of making that part of both heifer and ox look like the udder of an old cow. There is far too much of this scoring practised in Scotland, which prevents the pieces from retaining—which they should, as nearly as possible—their natural appearance.

In cutting up a carcass of beef the London butcher displays great expertness; he not only discriminates between the qualities of its different parts, but can cut out any piece to gratify the taste of his customers. In this way he makes the best use of the carcass and realizes the largest value for it, while he gratifies the taste of every grade of customers. A figure of the Scotch and English modes of cutting up a carcass of beef will at once show the difference; and upon being informed where the valuable pieces lie, an opinion can be formed as to whether the oxen the farmer is breeding or feeding possess the properties which will enable him to demand the highest price for them.



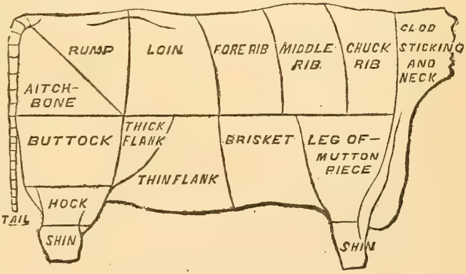
SCOTCH MODE OF CUTTING UP BEEF.

The sirloin is the principal roasting-piece, making a very handsome dish, and is a universal favorite. It consists of two portions, the Scotch and English sides; the former is above the lumbar bones, and is somewhat hard in ill-fed cattle; the latter consists of the muscles under these bones, which are generally covered with fine fat, and are exceedingly tender. The better the beast is fed, the larger is the under muscle, better covered with fat, and more tender to eat. The hook-bone and the buttock are cut up for steaks, beef-steak pie, or minced collops, and both these, together with the sirloin, bring the highest price. The large round and the small round are both well known as excellent pieces for salting and boiling, and are eaten cold with great relish. The hough is peculiarly suited for boiling down for soup, having a large proportion of gelatinous matter. Brown soup is the principal dish made of the hough, but its decoction forms an excellent *stock* for various dishes, and will keep in a state of jelly for a considerable time. The thick and the thin flank are both admirable pieces for salting and boiling. The tail, insignificant as it may seem, makes a soup of a very fine flavor. Hotel-keepers have a trick of seasoning brown soup or rather beef-tea, with a few joints of tail, and passing it off for genuine ox-tail soup. These are all the pieces which constitute the hind-quarter; and it will be seen that they are valuable both for roasting and boiling, not containing a single coarse piece.

In the fore-quarter, is the spare rib, the six ribs of the back end of which make an excellent roast, and when taken from the side opposite to the *lying* one, being free of the bones of the spine, it makes a large one; and it also makes excellent beefsteaks and beefsteak pie. The two runners and the nineholes make salting and boiling pieces; but, of these, the nineholes is much the best, as it consists of layers of fat and lean without any bone; whereas the fore parts of the runners have a piece of shoulder-blade in them, and every piece connected with that bone is more or less coarse-grained. The brisket eats very well boiled fresh in broth, and may be cooked and eaten with boiled greens or carrots. The shoulder-lyar is a coarse piece, and fit only for boiling fresh to make into broth or beef-tea. The nap, or shin, is analogous to the hough of the hind-leg, but not so rich and fine, there being much less gelatinous matter in it. The neck makes good broth; and the sticking-piece is a great favorite with some epicures, on account of the pieces of rich fat in it. It makes an excellent stew, as also sweet barley-broth, and the meat eats well when boiled in it.

These are all the pieces of the fore-quarter; and it will be seen that they consist chiefly of boiling-pieces, and some of them none of the finest—the roasting-piece being confined to the six ribs of the spare rib, and the finest boiling-piece, corned, only to be found in the nineholes.

The loin is the principal roasting-piece; the rump is the favorite steak-piece; the aitch-bone, the favorite stew; the buttock, the thick flank, and the thin flank are all excellent boiling-pieces when corned; the hock and the shin make soup and afford stock for the various requirements of the culinary art; and the tail furnishes ox-tail soup—a favorite English luncheon. These are all the pieces of the hind-quarter, and they are valuable of their respective kinds.



ENGLISH MODE OF CUTTING UP BEEF.

In the fore-quarter, the fore-rib, middle-rib, and chuckle-rib are all roasting-pieces, not alike good; but in removing the part of the shoulder-blade in the middle-rib, the spare-ribs below make a good broil or roast; the neck makes soup, being used fresh, boiled; the back end of the brisket is boiled, corned, or stewed; the leg-of-mutton piece is coarse, but is as frequently stewed as boiled; the shin is put to the same use as the shin and hock of the hind-quarter.

On comparing the two modes of cutting-up, it will be observed that in the English there are more roasting-pieces than in the Scotch, a large proportion of the fore-quarter being used in that way. The plan, too, of cutting the loin between the rump and aitch-bone in the hind-quarter, lays open the steak-pieces to better advantage than in the Scotch bullock. Extending the comparison from one part of the carcass to the other, in both methods, it will be seen that the most valuable pieces—the roasting—occupy its upper, and the less valuable—the boiling—its lower part. Every beast, therefore, that lays on beef more upon the upper part of its body is more valuable than one that lays the same quantity of flesh on its lower parts.

It is deemed unnecessary to enter into details as to the modes of cutting-up most in vogue in this country, as there is a needlessly great want of uniformity.

Of the qualities of beef obtained from the different breeds of cattle in England, there is no better meat than from the West Highlanders for fineness of grain and cutting up into convenient pieces for family use. The Galloways and Angus, when fattened in English pastures, are great favorites in the London market. The Short Horns afford excellent steaks, being thick of flesh, and the slice deep, large and juicy, and their covered flanks and nineholes are always thick, juicy, and well-mixed. The Herefords are somewhat similar to the Short

Horns, and the Devons, may, perhaps, be classed among the Galloways and Angus, while the Welsh cannot be compared to the West Highlanders. Taking, then, the breeds of Scotland as suppliers of good beef, they seem to be more valuable for the table than those of England.

There are, perhaps, not sufficient data in existence to determine the true proportion of offal of all kinds to the beef of any given fat ox; but approximations have been made, which may serve the purpose until the matter is investigated by direct experiment, under various circumstances. The dead weight bears to the live weight a ratio varying between .571 and .605 to 1; and on applying one or the other multiplier to the cases of the live weight, a pretty correct approximation is reached. The tallow is supposed to be eight one-hundredths of the live weight; so that the multiplier is the decimal .08. The hide is supposed to be five one-hundredths of the live weight; so to obtain its weight, a multiplier, .05, is used. The other offals are supposed to be in a proportion of about one-fourth of the live weight; so that the multiplier, .28, is as near as can be proposed under existing experience.

Beef is the staple animal food of this country, and it is used in various states—fresh, salted, smoked, roasted, and boiled. When intended to be eaten fresh, the *ribs* will keep the best, and with care will keep five or six days in summer, and in winter ten days. The middle of the *loin* is the next best, and the *rump* the next. The *round* will not keep long, unless it is salted. The *brisket* is the worst, and will not keep more than three days in summer, and in winter a week.

In regard to the power of the stomach to digest beef, that which is eaten boiled with salt only, is digested in two hours and forty-five minutes. Beef, fresh, lean, and rarely-roasted, and a beefsteak broiled, takes three hours to digest; that fresh, and dry-roasted, and boiled, eaten with mustard, is digested in three and a half hours. Lean fresh beef fried, requires four hours, and old hard salted beef boiled, does not digest in less than four and a quarter hours. Fresh beef-suet boiled takes five and a half hours.

The usual mode of preserving beef is by salting; and, when intended to keep for a long time, such as for the use of shipping, it is always salted with brine; but for family use it should be salted only with good salt; for brine dispels the juice of meat, and saltpetre only serves to make the meat dry, and give it a disagreeable and unnatural red color. Various experiments have been made in curing beef with salt otherwise than by hand-rubbing, and in a short space of time; and also to preserve it from putrefaction by other means than salt. Some packers put meal in a copper which is rendered air-tight, and an air-pump then creates a vacuum within it, thereby extracting all the air out of the meat; then brine is pumped in by pressure, which, entering into every pore of the meat formerly occupied by the air, is said to place it in a state of preservation in a few minutes. The carcass of an ox was preserved, in France, for two years from putrefaction by injecting four pounds of saline mixture into the carotid artery. Whether any such contrivance can be made available for family purposes, seems doubtful.

Cattle, when slaughtered, are useful to man in various other ways than by affording food from their flesh,—their offal of tallow, hides, and horns, forming extensive articles of commerce. Of the *hide*, the characteristics of a good one for strong purposes are strength in its middle, or *butt*, as it called, and lightness in the edges, or *offal.* A bad hide is the opposite of this—thick in the edges and thin in the middle. A good hide has a firm texture; a bad one, loose and soft. A hide improves as the summer advances, and it continues to improve after the new coat of hair in autumn until November or December, when the coat gets rough from the coldness of the season, and the hide is then in its best state. It is surprising how a hide improves in thickness after the cold weather has set in. The sort of food does not seem to affect the quality of the hide; but the better it is, and the better cattle have been fed, and the longer they have been well fed, even from a calf, the better the hide. From what has been said of the effect of weather upon the hide, it seems a natural conclusion that a hide is better from an ox that has been fed in the open air, than from one that has been kept in the barn. Dirt adhering to a hide injures it, particularly in stall-fed animals; and any thing that punctures a hide, such as warbles arising from certain insects, is also injurious. The best hides are obtained from the West Highlanders. The Short Horns produce the thinnest hides, the Aberdeenshire the next, and then the Angus. Of the same breed, the ox affords the strongest hide; but, as hides are applied to various uses, the cow's, provided it be large, may be as valuable as that of the ox. The bull's hide is the least valuable. Hides are imported from Russia and South America.

Hides, when deprived of their hair, are converted into *leather* by an infusion of the astringent property of bark.

The old plan of tanning used to occupy a long time; but, such was the value of the process, that the old tanners used to pride themselves upon producing a substantial article—which is more than can be said in many instances under modern improved modes, which hasten the process, much to the injury of the article produced. Strong infusions of bark make leather brittle; one hundred pounds of skin, quickly tanned in a strong infusion, produce one hundred and thirty-seven pounds of leather; while a weak infusion produces only one hundred and seventeen and a half,—the additional nineteen and a half pounds serving only to deteriorate the leather, and causing it to contain much less textile animal solid. Leather thus highly charged with tanning is so spongy as to allow moisture to pass readily through its pores, to the great discomfort and injury of those who wear shoes made of it. The proper mode of tanning lasts a year, or a year and a half, according to the quality of the leather wanted and the nature of the hides. A perfect leather can be recognized by its section, which should have a glistening marbled appearance, without any white streaks in the middle. The hair which is taken off hides in tanning, is employed to mix with plaster, and is often surreptitiously put into hair-mattresses.

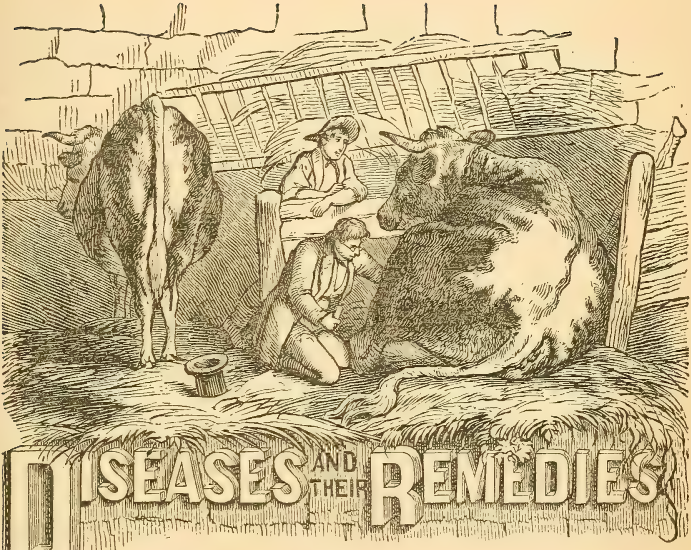
The principal subtances of which *glue* is made are the parings of ox and other thick hides, which form the strongest article and the refuse of the leather-dresser. Both afford from forty-five to fifty-five per cent. of glue. The tendons, and many other offals of slaughter-houses, also afford materials, though of an inferior quality, for this purpose. The refuse of tanneries—such as the ears of oxen and calves

—are better articles. Animal skins also, in any form, uncombined with tannin, may be worked into glue.

Ox-tallow is of great importance in the arts. Candles and soap are made of it, and it enters largely into the dressing of leather and the use of machinery. Large quantities are annually exported from Russia. Ox-tallow consists of seventy-six parts of stearine and twenty-four of oleine, out of one hundred parts.

The *horns* of oxen are used for many purposes. The horn consists of two parts: an outward horny case, and an inward conical-shaped substance, somewhat intermediate between indurated hair and bone, called the *fluid* of the horn. These two parts are separated by means of a blow upon a block of wood. The horny exterior is then cut into three portions by means of a frame saw. The lowest of these, next the root of the horn, after undergoing several processes by which it is rendered flat, is made into combs. The middle of the horn, after having been flattened by heat, and its transparency improved by oil, is split into thin layers, and forms a substitute for glass in lanterns of the commonest kind. The tip of the horns is used by makers of knife-handles and of the tops of whips, and for other similar purposes. The interior, or core of the horn, is boiled down in water. A large quantity of fat rises to the surface; this is put aside, and sold to the makers of yellow soap. The liquid itself is used as a kind of glue, and is purchased by the cloth-draper for stiffening. The bony substance remaining behind is then sent to the mill, and, after having been ground down, is sold to farmers for manure.

Besides these various purposes to which the different parts of the horn are applied, the clippings which arise in comb-making are sold to the farmer for manure, as well as the shavings which form the refuse of the lantern-makers. Horn, as is well known, is easily rendered soft and pliant in warm water; and by this peculiarity and its property of adhering like glue, large plates of horn can be made by cementing together the edges of small pieces rendered flat by a peculiar process, as a substitute for glass. Imitation of tortoise-shell can be given to horn by means of various metallic solutions. Horn, also, when softened, can be imprinted with any pattern, by means of dies



DISEASES AND THEIR REMEDIES

Under this head it is proposed to notice such diseases as are most common among cattle, together with their symptoms, and to suggest such treatment of the same as has been found in the practice of the author, in the main, effective. He is aware that much more space might have been appropriated to this head, as has been the case in other treatises of this class; but he doubts the propriety of multiplying words about diseases which are of very rare occurrence, deeming it more fitting to leave such instances exclusively to the intelligent consideration of the reliable veterinary practitioner.

For convenience of reference, the diseases here noticed have been arranged in alphabetical order; the whole concluding with information as to two or three operations which cannot be uninteresting to, or unprofitable for, the reader.

ABORTION.

The cow is, more than any other animal, subject to abortion, or slinking, which takes place at different periods of pregnancy, from half of the usual time to the seventh, or almost to the eighth month. The symptoms of the approach of abortion, unless the breeder is very much among his stock, are not often perceived; or, if perceived, they are concealed by the person in charge, lest he should be accused of neglect or improper treatment.

The cow is somewhat off her feed—rumination ceases—she is listless and dull—the milk diminishes or dries up—the motions of the fœtus become more feeble, and at length cease altogether—there is a slight degree of enlargement of the belly—there is a little staggering in her walk—when she is down she lies longer than usual, and when she gets up she stands for a longer time motionless.

As the abortion approaches, a yellow or red glairy fluid runs from the vagina (this is a symptom, which rarely, or never, deceives) her breathing becomes laborious and slightly convulsive. The belly has for several days lost its natural rotundity, and has been evidently falling,—she begins to moan,—the pulse becomes small, wiry, and intermittent. At length labor comes on, and is often attended with much difficulty and danger.

If the abortion has been caused by blows or violence, hether from brutality, or the animal's having been teased by her cows in season, or by oxen, the symptoms are more itense. The animal suddenly ceases to eat and to ruminate -is uneasy, paws the ground, rests her head on the manger hile she is standing, and on her flank when she is lying own—hemorrhage frequently comes on from the uterus, when this is not the case the mouth of that organ is pasmodically contracted. The throes come on, are distress-igly violent, and continue until the womb is ruptured. If l these circumstances be not observed, still the labor is rotracted and dangerous.

Abortion is sometimes singularly frequent in particular stricts, or on particular farms, appearing to assume an eizoötic or epidemic form. This has been accounted for in vrious ways. Some have imagined it to be contagious. It is indeed, destructively propagated among the cows, but ts is probably to be explained on a different principle from tht of contagion. The cow is a considerably imaginative anal, and highly irritable during the period of pregnancy. In bortion, the fœtus is often putrid before it is discharged; an the placenta, or afterbirth, rarely or never follows it, but becmes decomposed, and, as it drops away in fragments, em a peculiar and most noisome smell. This smell seems to peculiarly annoying to the other cows: they sniff at it an hen run bellowing about. Some sympathetic influence is ercised on their uterine organs, and in a few days a grear or less number of those that had pastured together like-wise bort. Hence arises the rapidity with which the fœtus is usally taken away and buried deeply, and far from the cows and hence the more effectual preventive of smearing the parts of the cow with tar or stinking oils, in order to conceal or subdue the smell; and hence, too, the inefficacy, as a preventive, of removing her to a far-distant pasture.

The pastures on which the blood or inflammatory fever is most prevalent are those on which the cows oftenest slink their calves. Whatever can become a source of general excitation and fever is likely, during pregnancy, to produce inflammation of the womb; or whatever would, under other circumstances, excite inflammation of almost any organ, has at that time its injurious effect determined to this particular one.

Every farmer is aware of the injurious effect of the coarse, rank herbage of low, marshy, and woody countries, and he regards these districts as the chosen residence of red water; it may be added, that they are also the chosen residence of abortion. Hard and mineral waters are justly considered as laying the foundation of many diseases among cattle, and of abortion among the rest.

Some careful observers have occasionally attributed abortion to disproportion in size between the male and the female. Farmers were formerly too fond of selecting a great overgrown bull to serve their dairy or breeding cows, and many a heifer, or little cow, was seriously injured; and she either cast her calf, or was lost in parturition. The breeders of cattle in later years are beginning to act more wisely in this matter.

Cows that are degenerating into consumption are exceedingly subject to abortion. They are continually in heat; they rarely become pregnant, or if they do, a great proportion of them cast their calves. Abortion, also, often follows a sudden change from poor to luxuriant food. Cows that have been out, half-starved in the winter, when incautiously turned on rich pasture in the spring, are too apt to cast their calves from the undue general or local excitation that is set up. Hence it is, that when this disposition to abort first appears in a herd, it is naturally in a cow that has been lately purchased. Fright, from whatever cause, may produce this trouble. There are singular cases on record of whole herds of cows slinking their calves after having been terrified by an unusually violent thunder-storm. Commerce with the bull soon after conception is also a frequent cause, as well as putrid smells—other than those already noticed—and the use of a diseased bull. Besides these tangible causes of abortion, there is the mysterious agency of the atmosphere. There are certain seasons when abortion is strangely frequent, and fatal; while at other times it disappears in a manner for several successive years.

The consequences of premature calving are frequently of a very serious nature; and even when the case is more favorable, the results are, nevertheless, very annoying. The animal very soon goes again to heat, but in a great many cases she fails to become pregnant; she almost invariably does so, if she is put to the bull during the first heat after abortion. If she should come in calf again during that season, it is very probable that at about the same period of gestation, or a little later, she will again abort: or that when she becomes in calf the following year, the same fatality will attend her. Some say that this disposition to cast her young gradually ceases; that if she does miscarry, it is at a later and still later period of pregnancy; and that, in about three or four years, she may be depended upon as a tolerably safe breeder. He, however, would be sadly inattentive to his own interests who keeps a profitless beast so long.

The calf very rarely lives, and in the majority of cases it is born dead or putrid. If there should appear to be any chance of saving it, it should be washed with warm water, carefully dried, and fed frequently with small quantities of new milk, mixed, according to the apparent weakness of the animal, either with raw eggs or good gruel; while the bowels should, if occasion requires, be opened by means of small doses of castor-oil. If any considerable period is to elapse before the natural time of pregnancy would have expired, it will usually be necessary to bring up the little animal entirely by hand.

The treatment of abortion differs but little from that of parturition. If the farmer has once been tormented by this pest in his dairy, he should carefully watch the approaching symptoms of casting the calf, and as soon as he perceives them, should remove the animal from the pasture to a comfortable cow-house or shed. If the discharge be glairy, but not offensive, he may hope that the calf is not dead; he will be assured of this by the motion of the fœtus, and then it is possible that the abortion may still be avoided. He should hasten to bleed her, and that copiously, in proportion to her age, size, condition, and the state of excitation in which he may find her; and he should give a dose of physic immediately after the bleeding. When the physic begins to operate, he should administer half a drachm of opium and half an ounce of sweet spirits of nitre. Unless she is in a state of great debility, he should allow nothing but gruel, and she should be kept as quiet as possible. By these means he may occasionally allay the general or local irritation that precedes or causes the abortion, and the cow may yet go to her full time.

Should, however, the discharge be fetid, the conclusion will be that the fœtus is dead, and must be got rid of, and that as speedily as possible. Bleeding may even then be requisite, if much fever exists; or, perhaps, if there is debility, some stimulating drink may not be out of place. In other respects the animal must be treated as if her usual time of pregnancy had been accomplished.

Much may be done in the way of preventing this habit of abortion among cows. *The fœtus must be got rid of immediately.* It should be buried deep, and far from the cow-pasture. Proper means should be taken to hasten the expulsion of the placenta. A dose of physic should be given; ergot of rye administered; the hand should be introduced, and an effort made, cautiously and gently, to detach the placenta; all violence, however, should be carefully avoided; for considerable and fatal hemorrhage may be speedily produced. The parts of the cow should be well washed with a solution of the chloride of lime, which should be injected up the vagina, and also given internally. In the mean time, and especially after the expulsion of the placenta, the cow-house should be well washed with the same solution.

The cow, when beginning to recover, should be fattened and sold. This is the first and the grand step toward the prevention of abortion, and he is unwise who does not immediately adopt it. All other means are comparatively inefficient and worthless. Should the owner be reluctant to part with her, two months, at least, should pass before she is permitted to return to her companions. Prudence would probably dictate that she should never return to them, but be kept, if possible, on some distant part of the farm.

Abortion having once occurred among the herd, the breeding cows should be carefully watched. Although they should be well fed, they should not be suffered to get into too high condition. Unless they are decidedly poor and weak, they should be bled between the third and fourth months of pregnancy, and a mild dose of physic administered to each. If the pest continues to reappear, the owner should most carefully examine how far any of the causes of abortion that have been detected, may exist on his farm, and exert himself to thoroughly remove them.

An interesting paper upon this subject may be found in the Veterinary Review, vol. 1., p. 434, communicated by Prof. Henry Tanner, of Queen's College, Birmingham, England. As it suggests a theory as to the origin of this disease which is, to say the least, quite plausible, we transfer the article:—

"I shall not go into any notice of the general subject of abortion, but rather restrict my remarks to a cause which is very much overlooked, and yet which is probably more influential than all other causes combined. I refer to the growth of ergotized grass-seeds in our pastures.

"The action of ergot of rye (*secale cornutum*) upon the womb is well known as an excitant to powerful action, which usually terminates in the expulsion of the fœtus. We have a similar disease appearing on the seeds of our grasses, but especially on the rye grass, and thus we have an ergot of the seeds of rye grass produced, possessing similar exciting powers upon the womb to those produced by the ergot of rye.

"Two conditions are necessary for the production of this ergot upon the seed of rye grass. The first is, the grass must be allowed to run to seed; and the second is, that the climate must be favorable for encouraging the development of the ergot.

"In practice, we find that on land which has been fed on during the summer, unless it has been grazed with unusual care, much of the grass throws up seed-stalks and produces seed. In districts where the climate is humid and rain abundant, as well as in very wet seasons, these seeds become liable to the growth of this ergot. Cattle appear to eat it with a relish, and the result is that abortion spreads rapidly through the herd. Heifers and cows, which, up to the appearance of the ergot, have held in calf, are excited to cast their calves by consuming it in their food. The abortion having once commenced, we know that the peculiarly sensitive condition of the breeding animal will cause its extension, even where the original cause may not be in operation; but their combined action renders the loss far more serious. If we add to this the tendency which an animal receives from her first abortion, to repeat it when next in calf, we see how seriously the mischief becomes multiplied.

"A somewhat extended observation, added to my own experience, has led me to the conviction that very much of the loss arising from abortion in our cows may be traced to the cause I have named. I feel assured the influence is even more extended than I have stated; for not only would the fœtus be thrown off in its advanced stage, but also in its earlier growth, thus causing great trouble to breeders of high-bred stock, the repeated turning of cows to the bull, and at most irregular intervals.

"The remedy differs in no respect from the ordinary mode of treatment, except that it compels a removal of the stock from the influence of the cause. Much, however, may be done by way of prevention; and this I shall briefly notice.

"It simply consists in keeping breeding cows and heifers upon land free from these seeds. Grass which has been grazed during the summer, will very generally, in a humid climate, have some of this ergotized seed; but I have not observed it produced before the end of July, or early in August; and I doubt its existence, to any injurious degree, up to this time. We may, therefore, consider such ground safe up to this period. If the breeding stock are then removed to grass land which, having been mown for this operation is a guaranty against any seeds remaining, it will seldom, if ever, happen that any injury will result from the production of ergotized grass later in the season.

"I will not venture to say that such will not appear in some cases where the grass has been cut early and has been followed by a rapid growth; but, at any rate, we have grazing land free from this excitant from July until September; and in the grass which has been mown late, I do not consider that there is the least fear of ergot's being again formed in that season. In this manner a farmer may keep grass land for his breeding stock entirely free from ergotized grass; and, consequently, so far as this cause is concerned, they will be free from abortion. How far young heifers may be prejudicially influenced, before they are used for breeding, by an excitement of the womb, appears to me to be a subject worthy of some attention on the part of the veterinary profession."

APOPLEXY.

This is a determination of blood to the head, causing pressure upon the brain. Animals attacked with this disease are generally in a plethoric condition. The usual symptoms are *coma* (a sleepy state), eyes protruding, respiration accelerated; finally, the animal falls, struggles, and dies.

In such cases, bleeding should be resorted to at an early period; give in drink one pound of Epsom-salts.

BLACK WATER.

This is simply an exaggerated stage of the disease known as Red Water,—to which the reader is referred in its appropriate place,—the urine being darker in color in consequence of the admixture of venous blood.

The symptoms are similar, though more acute. There is constipation at first, which is followed by diarrhœa, large quantities of blood passing away with the evacuations from the bowels; symptoms of abdominal pain are present; the loins become extremely tender; and the animal dies in a greatly prostrated condition.

The treatment does not differ from that prescribed in case of Red Water.

BRONCHITIS.

The trachea and bronchial tubes are frequently the seat of inflammation, especially in the spring of the year,—the symptoms of which are often confounded with those of other pulmonary diseases. This inflammation is frequently preceded by catarrhal affections; cough is often present for a long time before the more acute symptoms are observed. Bronchitis occasionally makes its appearance in an epizoötic form.

Symptoms. — A peculiarly anxious expression of the countenance will be observed; respiration laborious; a husky, wheezing, painful cough; on placing the ear to the windpipe a sonorous *râle* is heard; symptomatic fever also prevails to a greater or less extent.

Treatment.—Counter-irritation should be early resorted to; strong mustard, mixed with equal parts of spirits of hartshorn and water, and made into a thin paste, should be applied all along the neck, over the windpipe, and to the sides, and should be well rubbed in; or the tincture of cantharides, with ten drops of castor-oil to each ounce, applied in the same manner as the former, will be found equally effective. Give internally ten drops of Fleming's tincture of aconite every four hours, until five or six doses have been given; after which give one of the following powders twice a day: nitrate of potash, one ounce; Barbadoes aloes, one ounce; Jamaica ginger, half an ounce; pulverized-gentian root, one ounce; mix and divide into eight powders. If necessary a pound of salts may be given.

CONSUMPTION

This affection—technically known as *phthisis pulmonalis*—is the termination of chronic disease of the lungs. These organs become filled with many little cysts, or sacks, containing a yellowish or yellowish-white fluid, which in time is hardened, producing a condition of the lungs known as tuberculous. These tubercles in turn undergo another change, becoming soft in the centre and gradually involving the whole of the hardened parts, which, uniting with adjoining ones, soon forms cysts of considerable size. These cysts are known as abscesses.

No treatment will be of much service here. It is, therefore, better, if the animal is not too poor in flesh, to have it slaughtered.

CORYZA

In the spring, and late in the fall, catarrhal affections are quite common, occurring frequently in a epizoötic form. Coryza, or nasal catarrh,—commonly called a cold in the head,—is not very common among cows. As its name implies, it is a local disease, confined to the lining membrane of the nose; and, consequently, the general system is not usually disturbed.

Symptoms.—The animal will be observed to sneeze; the Schneiderian membrane (membrane of the nose) is heightened in color; cough sometimes accompanies; there is also a muco-purulent discharge from the nose. Neglect to attend to these early symptoms frequently occasions disease of a more serious nature; in fact, coryza may be regarded as the forerunner of all epizoötic pulmonary disorders.

A CHAT ON THE ROAD.

Treatment.—The animal should be kept on a low diet for a few days; the nostrils occasionally steamed, and one of the following powders given night and morning, which, in most cases, will be all the medicine required: nitrate of potassa, one ounce; digitalis leaves pulverized and tartrate of antimony, of each one drachm; sulphate of copper, two drachms; mix, and divide into eight powders. Should the disease prove obstinate, give for two or three days two ounces of Epsom-salts at a dose, dissolved in water, three times a day.

COW-POX.

Two varieties of sore teats occur in the cow, in the form of pustular eruptions. They first appear as small vesicles containing a purulent matter, and subsequently assume a scabby appearance, or small ulcers remain, which often prove troublesome to heal. This latter is the cow-pox, from which Jenner derived the vaccine matter.

Treatment.—Foment the teats well with warm water and Castile-soap; after which, wipe the bag dry, and dress with citrine ointment. The preparations of iodine have also been recommended, and they are very serviceable.

DIARRHŒA.

Cattle are frequently subject to this disease, particularly in the spring of the year when the grass is young and soft. Occasionally it assumes a very obstinate form in consequence of the imperfect secretion of gastric juice; the *fœces* are thin, watery, and fetid, followed by very great prostration of the animal.

The symptoms of diarrhœa are too well known to require any detailed description.

Treatment.—If in a mild form, the diet should be low; give two ounces of Epsom-salts, twice a day. In a more obstinate form, give two drachms of carbonate of soda in the food. Oak-bark tea will be found very useful in these cases; or one of the following powders, twice a day, will be found very advantageous: pulverized opium and catechu, each one and a half ounces; prepared chalk, one drachm; to be given in the feed.

Calves are particularly subject to this disease, and it often proves fatal to them. It sometimes assumes an epizoötic form, when it is generally of a mild character. So long as the calf is lively and feeds well, the farmer should entertain no fear for him; but if he mopes about, refuses his food, ceases to ruminate, wastes in flesh, passes mucus and blood with the *fœces*, and exhibits symptoms of pain, the case is a dangerous one.

In such an emergency, lose no time, but give two or three ounces of Castor-oil with flour-gruel, or two ounces of salts at a dose, followed with small draughts of oak-bark tea; or give, twice a day, one of the following powders: pulverized catechu, opium, and Jamaca ginger, of each half an ounce; prepared chalk, one ounce; mix, and divide into twelve powders. Bran washes, green food, and flour-gruel should be given, with plenty of salt.

DYSENTERY

This disease is very frequently confounded with the foregoing. A distinction, however, exists,—since inflammation appears in this disease, while it is absent in the former. In this affection, inflammation of the large intestines takes place, which is attended with diarrhœa. The *fœces* are covered with blood; the animal rapidly becomes prostrated, and death frequently comes to his relief.

Youatt says: "It is, however, with dysentery that the practitioner is most loth to cope,—a disease that betrays thousands of cattle. This, also, may be either acute or chronic. Its causes are too often buried in obscurity, and its premonitory symptoms are disregarded or unknown. There appears to be a strong predisposition in cattle to take on this disease. It seems to be the winding-up of many serious complaints, and the foundation of it is sometimes laid by those that appear to be of the most trifling nature. It is that in cattle which glanders and farcy are in the horse,—the breaking up of the constitution.

"Dysentery may be a symptom and concomitant of other diseases. It is one of the most fearful characteristics of murrain; it is the destructive accompaniment, or consequence, of phthisis. It is produced by the sudden disappearance of a cutaneous eruption; it follows the cessation of chronic hoose; it is the consequence of the natural or artificial suspension of every secretion. Were any secretion to be particularly selected, the repression of which would produce dysentery, it would be that of the milk. How often does the farmer observe that no sooner does a milch cow cease her usual supply of milk than she begins to purge! There may not appear to be any thing else the matter with her; but she purges, and, in the majority of cases, that purging is fatal.

"It may, sometimes, however, be traced to sufficient causes, exclusive of previous disease. Unwholesome food—exposure to cold—neglect at the time of calving—low and marshy situations—the feeding in meadows that have been flooded, where it is peculiarly fatal—the grazing (according to Mr. Leigh, and our experience confirms his statement) upon the clays lying over the blue lias rock—the neighborhood of woods and of half-stagnant rivers—the continuation of unusually sultry weather—overwork, and all the causes of acute dysentery, may produce that of a chronic nature; an acute dysentery—neglected, or badly, or even most skillfully treated—may degenerate into an incurable chronic affection. Half starve a cow, or overfeed her, milk her to exhaustion, or dry her milk too rapidly—and dysentery may follow.

"The following will, probably, be the order of the symptoms, if they are carefully observed: There will be a little dullness or anxiety of countenance, the muzzle becoming short or contracted; a slight shrinking when the loins are pressed upon; the skin a little harsh and dry; the hair a little rough; there will be a slight degree of uneasiness and shivering that scarcely attracts attention; then—except it be the degeneracy of acute into chronic dystentery—constipation may be perceived. It will be to a certain extent, obstinate; the excrement will voided with pain; it will be dry, hard, and expelled in small quantities. In other cases, perhaps, purging will be present from the beginning; the animal will be tormented with *tenesmus*, or frequent desire to void its excrement, and that act attended by straining and pain, by soreness about the *anus*, and protrusion of the *rectum*, and sometimes by severe colicky spasms. In many cases, however, and in those of a chronic form, few of these distressing symptoms are observed, even at the commencement of the disease; but the animal voids her *fœces* oftener than it is natural that she should, and they are more fluid than in a state of health; while at the same time she loses her appetite and spirits and condition, and is evidently wasting away."

Treatment.—Give one drachm of the extract of belladonna, three times a day, dissolved in water; or calomel and powdered opium, of each one drachm three times daily. As soon as the inflammatory stage passes by, give one of the following three times daily, in their gruel: nitrate of potash pulverized, gentian-root pulverized, of each one ounce; pulverized Jamaica ginger, one half an ounce; pulverized caraway, or anise-seed, six drachms. A bottle of porter given once or twice a day, will be found of very great advantage.

ENTERITIS.

This is an inflammation of the external or internal coat of the intestines, sometimes attended with violent purging, especially when it is confined to the internal coats. Oxen in good condition are more subject to this disease than are cows. It most freqently occurs in dry, hot weather. It is sudden in its attacks, and often fatal in its termination.

Symptoms.—The animal is dull, and not disposed to move about; the muzzle is dry, and the coat staring; the animal yields, on pressure of the *loins;* a weak, staggering gait, when forced to move; respiration hurried; pulse accelerated but small; eyes red, full and fiery; head protruding; mouth, ears, and horns hot; appetite bad; rumination ceases; the bowels become constipated; the animal moans continually, and froths at the mouth. These symptoms violently increase as the disease advances. The animal becomes more depressed and feeble, grinds his teeth, and appears half unconscious, and dies in convulsions.

Of the causes of this disease, Youatt, who is almost the only authority we have upon this subject, says: "It seems occasionally to be epidemic; for several instances of it occur, of the same character, and in the same district. M. Cruzel gives an illustration of this in his description of the disease that destroyed so many cattle, in the years 1826 to 1827, in the Department *de la Nievre.* Out of two hundred and eighteen cattle belonging to three farmers, one hundred and thirteen were attacked by this disease, and eighty-three of them died. One farmer in a neighboring district had nineteen head of cattle, all of which sickened, but only three were lost. These were unusually hot summers. The upland pasture was burnt up, or what remained of it was rendered unusually stimulating; and the acrid plants of the marshes and low grounds accquired additional deleterious agency.

"When isolated cases occur, they may generally be attributed to mismanagement. Exposure to cold, or the drinking of cold water when overheated with work; too hard work in sultry weather; the use of water stagnant, impure, or containing any considerable quantity of metallic salts; the sudden revulsion of some cutaneous eruption; the crowding of animals into a confined place; too luxuriant and stimulating food generally; and the mildewed and unwholesome food on which cattle are too often kept, are fruitful sources of this complaint."

Treatment.—In the early stage of the disease, give an active purge, and follow it with ten drops of Fleming's tincture of aconite, four times daily, for two days; then give drachm doses of the extract of belladonna; give no food for twenty-four or forty-eight hours, according to circumstances. Bleeding, if done early, is often beneficial. Counter-irritants to the belly are also recommended; the best are mustard, hartshorn, and water, mixed together—or tincture of cantharides, with one drachm of croton-oil added to every ounce

EPIZOÖTICS.

Diseases of this class have the same relation to the inferior animals that epidemic diseases have to man. Of course, they assume a very pestilential character. Scarcely a year passes away without diseases of this nature making their appearance in some parts of the world. They occur at all seasons of the year, but more generally prevail in the spring and fall. The period of their duration varies from months to years. They are, at times, mild in their attacks, and yield readily to proper treatment; at other times, they become painful pestilences, destroying every thing in their course.

The causes are generally sought for in some peculiar condition of the atmosphere. The use of the milk and flesh of diseased cattle has frequently been productive of malignant diseases in the human family.

Silius Italicus describes a fearful epizoötic, which first attacked the dog, then the feathered biped, then horses, and cattle, and, last of all, the human being.

> "On mules and dogs the infection first began,
> And, last, the vengeful arrows fixed in man."

Epizoötics, occurring in rats, cats, dogs, horses, and cattle, which were followed in the succeeding years by more fearful ones which attacked the human family, are numerously recorded. These scourges have appeared in all ages of the world; but, as time and space will not allow our entering upon an extended consideration of them,—however interesting they might be to the general reader,—we shall content ourselves by quoting, somewhat in brief, from the lectures of the late William Youatt on these fatal maladies:—

"In the year 801, and at the commencement of the reign of Charlemagne, an epidemic disease devastated a great portion of his dominions. This was attributed to the villainy of the Duke of Benevento, who was said to have employed a great many persons in scattering an enchanted powder over the fields, which destroyed both the cattle and the food of the cattle. M. Paulet seems inclined to give full credence to this, and says that history offers many proofs of this destructive and diabolical practice. He affirms that many persons were punished in Germany, France, and, particularly, at Toulouse, for the commission of this crime. Several of the suspected agents of these atrocities were put to the torture. and made full confession of their crime.

"Of the occurrence of these diseases from the year 800 to 1316,—an interval of mental darkness, and of horrors and calamities of every kind,—history records twenty cases, more or less destructive, and extending, with greater or less devastation, over France and Germany, Italy and England. Of these twenty, four date their origin from an excessive moisture in the air, accompanied by almost continual rains, and flooding the country to a considerable extent. One was supposed to be the consequence of long-continued drought and excessive heat; one was traced to the influence of an eclipse of the sun; another, to a comet; and a fourth, to a most unusually stormy winter. The reader will have the kindness to remember that we are here expressing the opinions of the writers of the day, and by no means, our own belief of the matter.

"Of the four which trace their origin to extreme wet and its consequences, the first occurred in France, in 820, after a long continuance of rain; and it was equally fatal to men and cattle. The second, which was equally fatal to both, appeared in Lorraine, in 889. The third broke out among the cavalry of the army of Arnoul, in its passage over the Alps, on its return to Italy. The fourth pervaded the whole of England in 1125, and was equally fatal to the biped and the quadruped.

"That which followed excessive heat and drought, was generally prevalent throughout Europe, but especially so in

Germany. It attacked oxen, sheep, and pigs. It appeared in 994, and lasted six months.

"The one which was attributed to the comet, and which principally attacked cattle, appeared in France in 943. Almost every animal perished.

"Another, that was supposed to be connected with an eclipse of the sun, was prevalent throughout the greater part of Germany, among men and animals, in 989.

"The disease, which was the consequence of a cold and boisterous winter, was principally prevalent in France, in 887, and committed sad ravages among the herds of cattle and sheep.

"Of the twelve others, of which authors do not indicate the cause, the first was in France, in 810, and principally among cattle. The second was also in France, in 850, and almost depopulated the country of cattle. The third, in 868, was common to all animals in France. The fourth, in 870, was in the same country, and caused severe loss among cattle. The fifth prevailed on the Rhine and in Germany, and destroyed an almost incalculable number of cattle. The sixth attacked the horses of the army of Arnoul in Lorraine, in 888. The seventh, in 940, destroyed a vast number of cattle in France, Italy, and Germany. The eighth and ninth were in France, in 941 and 942, and almost all the cattle in the country perished. The tenth pestilence broke out in England, in the year 1041, and frightful was its devastation among all animals, and, particularly, horned cattle. The eleventh also devastated our country, in 1103, and the ravages were dreadful. The twelfth was chiefly fatal in Germany, and particularly in Gueldres, in 1149.

"These twenty pestilences occurred in the space of 506 years. Five or six of them were most prevalent among cattle; two were almost confined to horses; twelve included, to a greater or less degree, almost every species of quadrupeds; and four extended to the human being. Among these the ravages of eight were most destructive in France; as many in Germany; and four in Italy and England.

"As far as we have hitherto proceeded, it will also appear that cattle are more subject to these diseases than any other species of domesticated animals, and that the pestilence is always most fearful among them. It is also evident that the maladies which proceed from cold or humidity are more frequent in the temperate and southern parts of Europe than those which depend upon drought, or almost any other cause.

"The malady lingers in different countries, in proportion to its want of power to accomplish at once all its devastation.

"After this time, there are few satisfactory accounts of these diseases for more than five centuries. We only know that, occasionally suspending their ravages,—or, rather, visiting new districts when they had ceased to desolate others—they have continued to be objects of terror and instruments of devastation, even unto the present day; and it is only within a few years that they have been really understood, and have become, to a certain degree, manageable."

In the United States, epizoötic diseases have been of frequent occurrence; but, owing to the want of properly qualified veterinary surgeons, they have not, until within a very recent period, been properly described or understood.

The day, however, is fast approaching when this void will be filled, and when epizoötic and other diseases will be correctly noted and recorded. The necessity for this must have been forcibly impressed upon the minds of the inhabitants of our country from the experience of the last ten or twelve years.

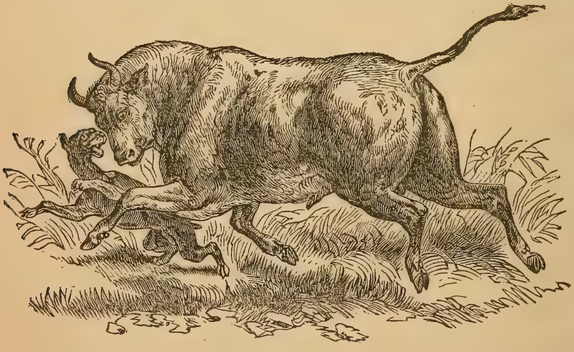
Respecting the late epizoötic among cattle in Portage County, Ohio, William Pierce, V.S., of Ravenna, thus describes the symptoms as they appeared, in a letter to the author: "A highly-colored appearance of the sclerotic coat of the eye, also of the *conjunctiva* (a lining membrane of the eyelid) and the Schneiderian membrane of the nose; a high animal heat about the head and horns; a highly inflammatory condition of the blood; contraction of all the abdominal viscera; hurried respiration; great prostration and nervous debility; lameness; followed by gangrene of the extremity of the tail, and the hind-feet; terminating in mortification and death."

Mr. Pierce is convinced that these symptoms are produced by the continued use of the ergot, or spur of the June grass,—the effects being similar to those produced upon the human family by long-continued use of ergot of rye. This disease assumes both an acute and chronic form.

The same gentleman also says: "Ordinary observers, as well as those who claim to be scientific, have entertained very conflicting opinions as to its general character; some regarding it as epizoötic, others as contagious; some attributing it to atmospheric influence, others to foulings in the stable or yard. Others, again, attribute it to freezing of the feet in winter. Cattle-doctors in a majority of cases, fail to cure it. I have, however, by a simple course of treatment, effected many signal cures. Some parties are so confident of the contagious character of the disease that they refuse to drive cattle along a road where it is known to exist. They even, oftentimes, wash their boots previous to entering their barn-yards, after walking over the ground where such diseased cattle have been running.

"Caution is both proper and commendable. I do not, however, regard it as a contagious disease, nor can it be transmitted by inoculation. The calf is carried during the progress of the disease, and delivered in apparently good health. The milk of the cow appears to be unaffected and harmless. I call this disease *sphacial fever*, or *gangrenous fever*.

"The ergot, or spur of the hay, is confined to the June grass, as far as my observation extends; owing, probably, to its early maturity. Most other kinds of grass are cut before the seeds have matured sufficiently to produce the spur. I was suspicious of the foulness of the feed before I examined any hay, and have found the spur in the hay wherever the diesase is found.



THE MAD BULL.

"Mr. Sanford, of Edinburgh, Ohio, purchased one half of a mow of hay from Mr. Bassett, of Randolph, which was removed to his farm in Randolph, eight miles distant. Of this hay, Mr. Sanford fed eleven cows some six or eight weeks. Mr. Bassett had been feeding the same to four cows. At about the same time, both heads began to show lameness. I visited Mr. S. after he had lost six cows, and examined the remaining five, four of which were lame and the other showed symptoms of the disease. He had two other cows, one of which was loaned to a neighbor, and the other was fed upon different hay, for convenience. The loaned cow was returned about the first of March,—the two then running with the ailing ones until the 24th of April, when I saw them sound and in good health.

"I then visited Mr. Bassett's stock, which I found infected with the same disease,—he having lost one, and the remaining three being lame, and much debilitated. The hoofs were sloughing off. Some of the same hay remained in the snow, which, upon examination, exhibited an abundance of the spur. Upon inquiry, I found that no such disease existed between the two farms, or in the neighborhood of either Mr. S. or Mr. B. The peculiarity of this circumstance at once swept away the last vestige of doubt from my mind. Mr. E. Chapman, of Rootstown, accompanied me, and can vouch for the correctness of these statements.

"He hooted at my opinions, asserting that he understood the disease, and that it was caused by the freezing of the feet. He has since, however, abandoned that idea, and honestly 'acknowledged the corn.' This ergot is regarded by some as a parasitic fungus, formed in other grains, an abundant vegeto-animal substance, and much disposed to putrefaction. We appear to be in the dark regarding its real composition. The little which has been written upon the subject, appears to be founded upon hypothesis, and that the most obscure. The articles to which I refer may differ in quality or property to a considerable extent, and we may forever remain in the dark, unless chemical investigation be instituted.

"In this particular disease, there appears to be singularity in the symptoms through all its various stages, which is likely to originate in the peculiarity of the cause which produces them. The effects and symptoms arising from the continued use of the ergot of rye, as manifested in the human system, have been but briefly hinted at by authors, and, probably, some of them are only reasonable conjectures. All they say is, that it produces violent headache, spaculation in the extremities, and death. Hitherto, its effects upon the inferior animal have been subjected to no investigation, and its peculiarity in the symptoms, differing from like phenonema by other causes, may yet be demonstrated. I am not alone in my opinion of this disease. I have taken counsel of those whose judgment cannot be questioned. Whatever difference of opinion exists is attributable to a want of investigation, and it will continue to exist until this singular phenonemon is clearly accounted for. Every opinion should be thoroughly criticized till facts are obtained. Every man's opinion is sacred to himself, but we should yield to conviction.

"Two classes of this disease are exhibited: one, of irritation, and the other, of debility; one, an acute, the other, a chronic form. The point at which it assumes the chronic form is between conjestion and gangrene. By close observation we can discover these to be different and higher degrees of the same disease. All subsequent degrees are dependent upon the first.

"The first symptom, or degree, is, probably, an attack upon the systematic circulation, produced by a certain medicinal and deleterious property existing in the ergot, and communicated to the blood through the absorption of the tongue. This is more evident from the fact that the digestive organs retain their normal condition till the last stages of the chronic form. The blood in the first two stages is healthy, and the peculiar influence is only apparent in the subsequent stages; as evidenced by the fact that the muscles and general good appearance, as well as life itself, last longer than could be possible, if this deleterious influence were exhausted upon the digestive organs and the blood, in its first stages. And, as we suppose that fever and congestion constitute an attack upon the red blood, which is exhibited by hurried pulsation, we might rationally infer that the next degree would be gangrene of the globule, causing sloughing, the same as if it were carried to the muscles, or surface. This sloughing of the globule would be the same as if exhibited on any other part of the organization, for the fibrin is identical with muscle, as albumen is identical with the white of an egg; and since congestion is the forerunner of gangrene at the extremities, or on the surface, so fever and quick pulsation are the forerunners of congestion of the blood. Gangrene cannot ensue without obstruction in the blood-vessels; and congestion cannot take place without obstruction in that which sustains the globule. As gangrene, then, is the first stage of decomposition of animal matter, so is congestion the first stage of decomposition of the globule; and as mortification is death in the organized body, so is congestion death in the organized globule.

"It appears evident that this disease, in all its forms and degrees of intensity, seeks vent or release; in other words, Nature conflicting with it, throws it off its track, or balance, and offers means of escape, or shows it a door by which it may make its exit. In the first stage of the disease, the dermoid (skin) tissues make the effort. In the inflammatory, the serous, and the congestive, the mucous gangrene seeks vent; if obtained, mortification is prevented; if not, mortification directly supervenes, and death terminates the case.

"In the case to which I refer, observation confirms my opinion that absolute mortification without vent determines the gangrene of the blood, and is hardly curable; but that gangrene's finding vent determines it to be curable, and the recovery highly probable."

EPIZOÖTIC CATARRH.

Catarrh frequently assumes an epizoötic form of a very virulent character, originating spontaneously and extending over a large section of country at or about the same time. A cold spring succeeding a mild winter, is peculiarly productive of malignant catarrh. This is one of the most distressing and fatal diseases to which cattle are subject.

Symptoms.—The animal appears dull, and unwilling to move about, staggering when forced to do so; obstinate costiveness is usually one of the earliest symptoms, succeeded by diarrhœa, which is equally difficult of management; sometimes, however, diarrhœa is present from the first; the animal loses flesh rapidly; the coat is staring; appetite is lost; tumors form about the head, neck, back, and joints, which appear to be filled with air, and upon pressure cause a crepitating sound; saliva flows from the mouth, becoming very fetid as the disease progresses. The animal always dies of putrefaction.

Treatment.—This disease should be treated early, or not at all. Good nursing is very essential. When costiveness is present, give Barbadoes aloes, one ounce; croton-oil, ten drops; mix together; or give one pint of linseed-oil, to which add from ten to twenty drops of castor-oil. If the bowels are not open in twenty-four hours, give four ounces of sulphate of magnesia every six hours until they are opened. Follow this with tincture of aconite, ten drops in water, every four hours, until the fever has abated.

Bleeding has been recommended by some writers; but the author has failed to experience any benefit from resorting to it, but, on the contrary, has seen much injury result from the use—or, rather, the abuse—of the lancet. He is, indeed, inclined to attribute much of the fatality attending this disease to indiscriminate blood-letting.

When much debility exists, the animal should be sustained by tonics and stimulants. One ounce of nitric ether and half an ounce of tincture of opium, given in a little water, will be found beneficial. It should be given twice a day. Pulverized gentian-root, one ounce; Jamaica ginger, half an ounce; pulverized cloves, half an ounce; mixed, and divided into four powders, one to be given at night and at morning; will be found useful, in place of the opium and ether.

FARDEL.

This disease is properly known by the name of clue-bound. The manyplus, or omasum (third stomach), frequently becomes so choked up with food that it is hard and dry, and the operation of the digestive organs is very seriously impaired. The animal eats voraciously, for a time, but stops suddenly and trembles; the countenance assumes a peculiarly haggard appearance; there is a wild expression of the eye; a foaming at the mouth; a tendency to pitch forward, and at times a falling head-foremost to the ground. Occasionally, the symptoms are very active, speedily terminating in death. There are few diseases of a constitutional character in which the stomach is not, more or less, sympathetically involved.

"Toward the end of September, 1746, a great number of cows died at Osterwich, in the principality of Halberstadt. Lieberkuhn, a celebrated physician,—there were no veterinary surgeons at that time,—was sent to examine into the nature of the disease, which was supposed to be one of the species of murrain that was then committing such ravages among the cattle in various parts of the Continent. There were none of the tumors, or pestilential buboes, that, in an earlier or later period of the malady, usually accompanied and characterized murrain; but upon inspection of the dead bodies, considerable peritoneal inflammation was found; the first and second stomachs were filled with food, but the third stomach was the palpable seat of the disease; its leaves were black and gangrened. The mass contained between the leaves was black, dry, and so hard that it could scarcely be cut with a scalpel. It intercepted the passage of the food from the first two stomachs to the fourth; and this latter stomach was empty and much inflamed. Neither the heart, nor the lungs, nor the intestines exhibited any trace of disease. Twelve cows were opened, and the appearances were nearly the same in all of them."

Treatment.—Give one and a half pounds of Epsom-salts, dissolved in three pints of water; or one quart of potash, three times daily, dissolved in water, will be found useful in this disease

FOUL IN THE FOOT.

This is caused by hard or irritating substances making their way in between the claws of the foot, causing inflammation, and sometimes ulceration, in the parts. The pasterns swell, and the animal becomes lame.

The foot should be thoroughly washed, and all foreign substances removed. A pledget of tow, saturated with tar and sprinkled with powdered sulphate of copper, should be inserted between the claws. This usually requires but one or two applications.

GARGET.

This is a hard, knotty condition of the udder, which sometimes follows calving, in consequence of the sudden distention of the bag with milk; and the inflammation which supervenes causes a congealed or coagulated condition of the milk to take place, of which, if neglected, suppuration and abscesses are the result.

Treatment.—Let the calf suck the dam as speedily as possible, and, if the hardness is not then removed, foment the udder with warm water; after which, wipe it dry, and apply to the entire surface melted lard as hot as the animal will bear. This is, generally, all that is required, the most obstinate cases yielding to it. If abscesses form, they should be lanced.

GASTRO-ENTERITIS.

This disease—otherwise known as wood-evil, or moor-ill—arises from eating the buds of oak, young ash, and other trees, which are of a very highly stimulating or irritating character. As the intestinal canal is liable to inflammatory action from irritant substances admitted into it, animals are found to become diseased from eating too freely of these vegetable substances.

Symptoms.—Loss of appetite and suspended rumination; mouth hot; skin dry; pulse from sixty to seventy; swelling and pain of the belly; obstinate constipation; fæces hard and covered with blood; urine of a strong odor, highly colored, and voided with difficulty.

Treatment.—The animal should be bled, and a strong purgative administered, followed by aconite and belladonna, as in enteritis. Injections of Castile-soap and water should be freely used; the application of the mustard, hartshorn, and water to the belly will also be found very beneficial.

HOOSE.

This disease—known also as catarrh—is occasionally the sequence of coryza, but more frequently it arises from an impure atmosphere; consequently, in cow-houses where animals are crowded together in numbers, it is most frequently found. Scanty provender, and of an inferior quality, is among the exciting causes of hoose, producing, as it does, a debilitated state of the system, which, upon exposure of the animal to cold, or wet, hastens the disorder. Some breeds of cattle are peculiarly liable to this disease, which, if not arrested in its early stage, runs on, involving the lungs, and frequently terminating in consumption. Of all our domestic animals, neat cattle are most subject to pulmonary diseases. This is attributable to the neglect and exposure which are far too often their lot. Butchers will testify that a large portion of all cattle slaughtered have abscesses and other diseases of the lungs.

Symptoms.—Loss of appetite; muzzle dry; coat rough, or staring; respiration quickened; horns hot; ears, nose, and legs cold; husky cough; pulse from sixty to seventy, small and thready; bowels frequently constipated.

Treatment.—Give one ounce of the following powders every six hours, until the bowels are opened: Barbadoes aloes, one and half ounces; nitrate of potassa, half an ounce; ginger, six drachms; mix and divide into six powders. Setons in the dewlap are often of great benefit.

HOOVE.

Hoove, or blown, so common, and often so speedily fatal in cattle, is the result of fermentation in the *rumen*, or paunch, in consequence of the animal's having eaten large quantities of wet grass, luxuriant clover, turnips, etc. An accumulation of gas is the result of this fermentation, which greatly disturbs the haunch and left side of the belly, causing much pain to the animal, and frequently threatening suffocation.

Treatment.—Drench the animal with one ounce of spirits of hartshorn in one quart of water, the object being to neutralize the gas which is present in the rumen; or, two ounces of table salt dissolved in one quart of water will be found very effectual. If these do not speedily give relief, an active purge should be given. Injections of soap and water should be freely used. If the case still proves obstinate, and the life of the animal is threatened, the paunch should be punctured. For this purpose, the trochar—an instrument specially adapted—should be used; but, in the absence of an instrument, an ordinary pocket-knife may be employed, taking care not to make a large opening. The proper point to operate is midway between the last rib and the prominent point of the hip-bone, about twelve inches from the centre of the back or loins. Few cases have a fatal termination where this operation has been properly performed.

HYDATIDS.

Worms in the brain occasionally occur, causing great uneasiness to the animal and generally proving fatal.

The symptoms are, loss of appetite; suspended rumination; a fevered condition of the system; horns and ears hot; respiration disturbed; coat staring, etc. No course of treatment will prove efficacious in this disease.

Pressure on the brain may occur from an accumulation of water, tumors, bruises, etc., in the cranial case. In either case, the same effects are produced as are observed in apoplexy.

INFLAMMATION OF THE BLADDER.

Inflammation of the bladder generally accompanies inflammation of the kidneys, though it is sometimes found disconnected and alone. It is occasionally caused by calculous concretions in the bladder,—which should be removed,—causing very acute abdominal pain to the animal. She makes frequent efforts to stale, passing but a few drops of urine at a time. The pulse is full and rapid; mouth clammy; nose dry; eyes bloodshot; appetite lost; moaning, and walking with a staggering gait.

Treatment.—Inject into the bladder one quart of tepid water, and from one to two ounces of tincture of opium mixed together. Give internally one of the following powders every hour until relieved; nitrate of potassa, one ounce; tartrate of antimony, and pulverized digitalis leaves, each one drachm; mix, and divide into six powders. Mucilaginous draughts should be freely given.

Rupture of the bladder sometimes occurs, but there are no symptoms by which it may be known; and, if there were, no service could be rendered in the way of repairing the injury; the animal must die.

INFLAMMATION OF THE HAW.

The ox, like the horse, has a membrane of semilunar form in the inner corner of the eye, which is capable of being thrown over the entire eyeball, for the purpose of cleansing the eye from any foreign substance which may get into it. This membrane is commonly called the haw, and is susceptible of attacks of inflammation, which cause it to swell, frequently even closing up the eye.

Treatment.—Give a dose of physic, and, if the animal is plethoric, extract a little blood from the vein on the same side as the affected eye. Apply to the eye either of the following washes: tincture of opium, one ounce; rain-water, one pint; or, tincture of aconite, one drachm, to one pint of water. Bathe two or three times a day.

INFLAMMATION OF THE KIDNEYS.

This disease—sometimes called nephritis—occurs occasionally in cattle in consequence of their eating bad or unwholesome food, or of the abuse of diuretics, etc.

The symptoms are very insidious in their approach. The loins are very tender upon pressure; the urine is voided in small quantities. As the disease advances, the symptoms become more marked and acute. The animal is dull, and feeds daintily; the evacuation of urine is attended with increased pain, and the urine is highly colored and bloody; the nose is dry; the horns, ears, and extremities are cold; respiration hurried; the pulse full, hard, and throbbing.

Treatment.—Give one pint of linseed-oil and ten drops of castor-oil, mixed together; follow this with small doses of salts once a day, for three or four days; give injections of water, one half a gallon to two ounces of tincture of arnica. Mustard applications to the loins are also very useful.

INFLAMMATION OF THE LIVER.

Diseases of the liver are of very common occurrence,—a fact with which all beef-butchers are familiar. Perhaps no organ in the animal economy is so liable to disease. The obscurity of the symptoms and the good condition of the animal prevent its discovery, as a general thing, during its lifetime. When, however, the disease assumes an active form,—known as the yellows, jaundice, or inflammation of the liver,—the symptoms are more readily detected.

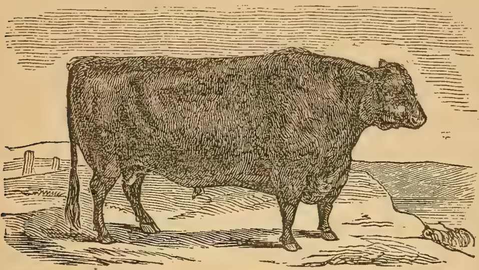
Symptoms.—A yellowish color of the eye will be observed; skin, urine, etc., highly colored; soreness, on pressure, on the right side; loss of appetite; dullness; constipation of the bowels, etc.

Treatment.—Calomel is the most reliable medicine known to practitioners for diseases of the liver. Its abuse, however, has brought it into disrepute. Yet, as with ordinary care it may be advantageously used, we will prescribe it as that upon which the most dependence is to be placed, and in doing so, will endeavor to have it used safely. Bleeding has been recommended: but the author has never found any benefit resulting. Give Epsom-salts, in doses of four ounces each, every night, with one scruple of calomel, until the animal is relieved. Mustard and water should be frequently applied to the right side, and well rubbed in.

LARYNGITIS.

This disease is of rare occurrence in cattle. In it, the mucous membrane lining the larynx is in a very irritable condition; the least pressure upon the parts affected causes intensely excruciating pain; the respiration becomes quick, painful, and laborious; the animal often appears to be hungry, yet does not eat much, in consequence of the pain occasioned by the act of swallowing.

Treatment.—Apply to the throat externally strong mustard, mixed, with equal parts of aqua ammonia and water, to a thin paste, every hour, until it produces an effect upon the skin; sponging the parts each time with warm water before applying the mustard. The animal should not be bled. Give upon the tongue, or in drink, half-drachm doses of nitrate of potassa, every three or four hours, until relief is obtained. If suffocation threatens, the operation of tracheotomy is the only resort.



AN ABERDEENSHIRE POLLED BULL.

Cloths saturated with cold water, wrapped around the neck so as to cover the larynx, frequently afford relief. A purgative will also be found useful.

LICE.

Cattle are very subject to lice, particularly when they are neglected, half-starved, and in poor condition. Good care and good feeding—in connection with the treatment recommended in mange, to which the reader is referred—will comprise all that is requisite.

MANGE.

Mange, or leprosy, is one of the most unpleasant and difficult diseases to manage of all the ailments to which cattle are subject requiring the nicest care and attention to render it easy of cure. An animal badly nursed will not, under the most skillful treatment, quickly recover. Its causes are, in the main, due to poor food, which produces a debilitated condition of the system, and in connection with a want of cleanliness, causes a development of the *acari*, or minute insects, exciting very great irritation upon the skin and causing the cow to rub herself against every object with which she comes in contact. The hair falls off; a scurfy appearance of the skin is perceptible; and the animal is poor in condition and in milk. The great trouble in treating this disease springs from its contagious character; for, no sooner is the animal, oftentimes, once free from the *acari* than it comes in contact with some object against which it has previously been rubbing, when the *acari* which were left upon that object are again brought in contact with the animal, and the disease is reproduced. If, immediately after the proper applications are made, the animal is removed to other quarters, and not allowed to return to the former ones for six or eight weeks, there is, generally speaking, but little trouble in treating the disease.

Take the animal upon a warm, sunny day, and with a scrubbing-brush cleanse the skin thoroughly with Castile-soap and water; when dry, apply in the same manner the following mixture; white hellebore, one ounce; sulphur flower, three ounces; gas-water, one quart; mix all well together. One or two applications are, generally, all that will be required. Give internally one of the following powders in the feed, night and morning: flowers of sulphur, two ounces; black antimony, one ounce; nitrate of potassa, one ounce; mix, and divide into eight powders.

MURRAIN.

This is one of the most malignant diseases to which cattle are liable. Fortunately, however, true murrain is comparatively rare in this great stock-raising country.

The entire system seems to partake of the disease. The first indication of its approach is a feverish condition of the system, attended with a frequent and painful cough; the pulse is small, hard, and rapid. As the disease advances, the respiration becomes disturbed; the flanks heave; vesicular eruption is observed upon the teats, mouth, and feet; the horns are cold; the animal is sometimes lame; constipation and, sometimes, diarrhœa are accompanying symptoms; *fœces* black and fetid; the eyes weep and become much swollen; great tenderness along the spine; a brown or bloody discharge from the nose and mouth; the animal moans incessantly, grinds his teeth, rarely lies down, but to get up again quickly; finally, the breath becomes very offensive; tumors make their appearance in various parts of the body, which, in favorable cases, suppurate, and discharge a fetid matter.

Treatment.—Give one fourth of a pound of Epsom-salts, with one drachm of Jamaica ginger, twice a day, for two or three days. A bottle of porter, twice a day, will be found serviceable. Very little medicine is required internally in this disease, but much depends upon good nursing. External applications are chiefly to be depended upon. A solution of chloride of lime should be applied to the eruptions, or a solution of the chloride of zinc, twenty grains to an ounce of water; or, of sulphate of zinc, two drachms to a pint of water; or pulverized charcoal applied to the parts will be found useful.

NAVEL-ILL.

Inflammation of the navel in calves occasionally occurs, causing redness, pain, and sudden swelling in the part affected. This disease, if not promptly attended to, speedily carries off the creature.

Treatment.—Foment the part well with warm hop-tea; after which, the application of a cloth, well saturated with lead-water and secured by bandages, should be applied. Internally, doses of Epsom-salts, of two ounces each, dissolved in half a pint of water, should be given until the bowels are acted upon. After the inflammation has subsided, to counteract the weakness which may follow, give a bottle of porter two or three times a day.

OBSTRUCTIONS IN THE ŒSOPHAGUS.

Choking in cattle is of common occurrence, in consequence of turnips, potatoes, carrots, or other hard substances, becoming lodged in the œsophagus, or gullet.

These obstructions can sometimes be removed by careful manipulations with the hand; but, where this can not be accomplished, the flexible probang should be employed. This is a long India-rubber tube, with a whalebone stillet running through it, so as to stiffen it when in use. This instrument is passed down the animal's throat, and the offending substance is thus pushed down into the stomach.

OPEN JOINTS.

Opening of the joint generally results from accidents, from puncturing with sharp substances, from kicks, blows, etc. These injuries cause considerable nervous irritation in the system, and sometimes cause lock-jaw and death.

Treatment.—Close up the wound as speedily as possible. The firing-iron will sometimes answer the purpose very well. The author depends more upon the application of collodion—as recommended in his work upon "The Horse and His Diseases" for the same trouble—than upon any other remedy. It requires care in its application, in order to make it adhere firmly. Shoemakers'-wax, melted and applied, answers a very good purpose.

PARTURITION.

In natural labor—as has been suggested in a former part of this work—the aid of man is rarely required in bringing away the calf. But it not infrequently happens that, from malformation or wrong presentation, our assistance is required in order to deliver the animal.

The brute force, which has been far too often heretofore resorted to, should no longer be tolerated, since the lives of many valuable animals have been sacrificed by such treatment. Very often, by gentle manipulation with the greased hand, the womb can be so dilated as to afford a comparatively easy exit for the *fœtus*.

If, however, the calf is presented wrong, it must be pushed back and placed in its proper position, if possible. In natural labor, the fore-legs, with the head lying between them, are presented; in which position—unless deformity, either in the *pelvis* of the cow, or in the *fœtus*, exists—the calf is passed with little difficulty, and without assistance. It sometimes happens that the head of the fœtus is turned backward. When this happens, the attendant should at once strip himself to the waist, bathe his arms and hands with a little sweet-oil, or lard, and introduce them into the *vagina*, placing a cord around both fore-feet, and then, pushing them back, search for the head, which is to be brought forward to its proper position. The feet are next to be brought up with it. No force should be used, except when the cow herself makes the effort to expel the calf; otherwise, more harm than good may be done.

A case of this kind recently occurred in the author's practice, being the third within a year. The subject was a cow belonging to William Hance, Esq., of Bordentown, New Jersey. After she had been in labor for some twenty hours, he was called upon to see her. Upon inquiry, he found that several persons had been trying, without success, to relieve her. She was very much prostrated, and would, doubtless, have died within two or three hours, had no relief been afforded. The legs of the *fœtus* protruded as far as the knees; the head was turned backward, and with the body, pressed firmly into the *vagina*, so that it was impossible to return it, or to bring the head forward. The operation of embryotomy was, therefore, at once performed, by cutting away the right shoulder, which enabled the operator, with the aid of his appropriate hooks, to bring the head forward, when the calf came away without further trouble,—the whole operation not requiring fifteen minutes. The *uterus* was then washed out, and the animal placed in as comfortable a position as possible, and a stimulating draught given, composed of two ounces of nitric ether, one ounce of tincture of opium, and a half pint of water. This was followed with a few doses of Fleming's tincture of aconite, ten drops in a little water, every few hours. In a few days the animal had entirely recovered.

Occasionally, the head comes first, or the head and one leg. In such cases, a cord should be slipped around the jaw and leg, and these then pushed back, so as to allow the other leg to be brought up. When this cannot be done, the *fœtus* can, in most cases, be removed in the original position.

Breech, side, back, and other presentations sometimes occur; in all of which instances, the *fœtus* must be turned in such a position that it can be brought away with as little trouble as possible. When this cannot be accomplished, the only resort is embryotomy, or cutting up of the fœtus, which operation can only be safely performed by the qualified veterinary surgeon.

Since writing the above, another case has occurred in the author's practice. The cow—belonging to Samuel Barton, Esq., near Bordentown, New Jersey—had been in labor some eighteen hours; upon an examination of the animal, the calf was found to be very much deformed, presenting backwards,—one of the hind-legs having been pulled off by the person or persons assisting her previous to the author's arrival. Finding it impossible to deliver her in the usual way, emrbyotomy was in this instance employed. By this means, after taking out the intestines, lungs, etc., of the *fœtus*, and cutting away its hind-quarters, the fore-parts were brought away. The head presented a singular appearance; the under jaw was so twisted as to bring the front teeth on the side of the face; the spinal column or backbone, was turned twice around, resembling a spiral string; the front legs were over the back; the ribs were much contorted; the hind-parts were as much deformed; and, taken altogether, the deformity was the most singular which has been brought under the author's observation.

Free Martins.—It has long been supposed by stockbreeders, that if a cow produce twins, one of which is a male and the other a female, the female is incapable of producing young, but that the male may be a useful animal for breeding purposes. Many instances have occurred when the twin sister of a bull has never shown the least desire for the male.

This indifference to sexual commerce arises, doubtless, from the animal's being but imperfectly developed in the organs of generation. This fact has been established by the investigations of Mr. John Hunter, who had three of these animals slaughtered for anatomical examination. The result is thus reported: "The external parts were rather smaller than is customary in the cow. The *vagina* passed on, as in the cow, to the opening of the *urethra*, and then it began to contract into a small canal, which passed on into the division of the *uterus* into the two horns; each horn passed along the edge of the broad ligament laterally toward the *ovaria*.

"At the termination of these horns were placed both the ovaries and the testicles. Both were nearly of the same size, which was about as large as a small nutmeg. To the *ovaria*, I could not find any Fallopian tube.

"To the testicles were *vasa deferentia*, but they were imperfect. The left one did not come near the testicle; the right one only came close to it, but did not terminate in the body called the *epididymis*. They were both pervious and opened into the *vagina*, near the opening of the *urethra*.

"On the posterior surface of the bladder, or between the *uterus* and the bladder, were the two bags, called *vesiculæ seminales* in the male, but much smaller than they are in the bull. The ducts opened along with the *vasa deferentia*. This animal, then, had a mixture of all the parts, but all of them were imperfect."

Well-authenticated cases have, however, occurred where the female has bred, and the offspring proved to be good milkers. There are several instances on record of cows' giving birth to three, four, and even five calves at a time. There were on exhibition, in 1862, at Bordentown, New Jersey, three free martins, two sisters and a brother, which were beautiful animals. These were from a cow belonging to Mr. Joab Mershon, residing on Biles Island, situated in the Delaware River, a short distance above Bordentown. They were calved November 1st, 1858, and were therefore nearly four years of age. They had never shown the least desire for copulation. Their aggregate weight was 4300 pounds.

We extract the following from the London Veterinarian, for 1854:—"A cow, belonging to Mr. John Marshall, of Repton, on Wednesday last, gave birth to *five, live healthy calves*, all of which are, at the time I write, alive and vigorous, and have every appearance of continuing so. They are all nearly of a size, and are larger and stronger than could be supposed. Four of them are bull-calves.

"The dam is by no means a large one, is eleven years old, of a mongrel breed, and has never produced more than one offspring at any previous gestation. I saw her two days after she had calved, at which time she was ruminating, and did not manifest any unusual symptoms of exhaustion. I may mention that the first four calves presented naturally; the fifth was a breech-presentation."

CLEANSING.—The *placenta,* or after-birth, by which the *fœtus* is nourished while in embryo, should be removed soon after calving. Generally, it will come away without any assistance. This is what is called "cleansing after calving." When, however, it remains for some time, its function having been performed, it becomes a foreign body, exciting uterine contractions, and therefore injurious. The sooner, then, it is removed, the better for the animal as well as the owner. To accomplish this, the hand should be introduced, and, by pulling gently in various directions, it will soon yield and come away. Should it be allowed to remain, it rapidly decomposes, producing a low, feverish condition of the system, which greatly interferes with the general health of the animal.

INVERSION OF THE UTERUS.—The *uterus* is sometimes turned inside out after calving. This is, generally, the result of debility, or severe labor. The *uterus* should be replaced as carefully as possible with the hands, care being taken that no dirt, straw, or other foreign substance adheres to it. Should it again be expelled, it would be advisable to quiet the system by the use of an anæsthetic, as chloroform, or—which is much safer—chloric ether. As soon as the animal is under the influence of this, the *uterus* may be again replaced. The hind-quarters should be raised as high as possible, in order to favor its retention. The animal should have a little gruel and a bottle of porter given to her every five or six hours, and the *vulva* should be bathed frequently with cold water.

PHRENITIS.

Inflammation of the brain is one of those dreadful diseases to which all animals are liable. It is known to the farmer as frenzy, mad staggers, etc.

The active symptoms are preceded by stupor; the animal stubbornly stands in one position; the eyes are full, red, and fiery; respiration rapid; delirium soon succeeds; the animal, bellowing, dashes wildly about, and seems bent on mischief, rushing madly at every object which comes in its way.

The causes of this disease are overwork in warm weather, a plethoric condition of the system, and too stimulating food. Prof. Gamgee, of the Edinburgh Veterinary College, relates a case resulting from the presence within the external *meatus* of a mass of concrete cerumen, or wax, which induced inflammation of the ear, extending to the brain.

Treatment.—As this is attended with considerable risk, unless it is taken prior to the frenzied stage, bleeding almost to fainting should be resorted to, and followed by a brisk purge. Take one ounce of Barbadoes aloes, and ten to fifteen drops of Croton-oil; mix the aloes with one pint of water and the oil, using the mixture as a drench. One pound of Epsom-salts will answer the purpose very well, in cases where the aloes and oil cannot be readily obtained. Application of bags of broken ice to the head, is very beneficial. Spirits of turpentine, or mustard, together with spirits of hartshorn and water should be well rubbed in along the spine, from the neck to the tail.

PLEURISY.

This is an inflammation of the *pleura*, or the serous membrane which lines the cavity of the chest, and which is deflected over the lungs. Inflammation of this membrane rarely occurs in a pure form, but is more generally associated with inflammation of the tissue of the lungs. If this disease is not attended to at an early period, its usual termination is in hydrothorax, or dropsy of the chest. The same causes which produce inflammation of the lungs, of the bronchia, and of the other respiratory organs, produce also pleurisy.

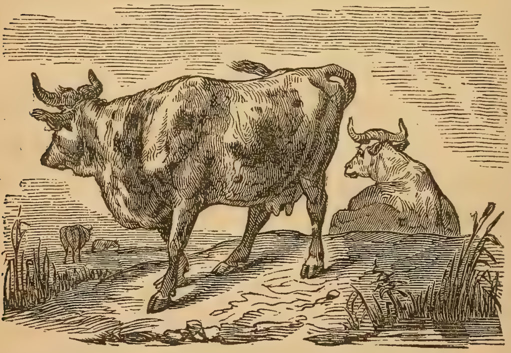
Symptoms.—The respiration is quick, short, and painful; pressure between the ribs produces much pain; a low, short, painful cough is present; the respiratory murmur is much diminished,—in fact, it is scarcely audible. This condition is rapidly followed by effusion, which may be detected from the dullness of the sounds, on applying the ear to the lower part of the lungs. The febrile symptoms disappear; the animal for a few days appears to improve, but soon becomes weak, languid, and often exhausted from the slightest exertion.

Treatment.—The same treatment in the early stage is enjoined as in inflammatory pneumonia, which the reader will consult—counter-irritation and purgatives. Bleeding never should be resorted to. When effusion takes place, it is necessary to puncture the sides with a trochar, and draw away the fluid, giving internally one of the following purges three times a day: rosin, eight ounces; saltpetre, two ounces: mix, and divide into eight powders. Half-drachm doses of the iodide of potash, dissolved in water, to be given three times daily, will be found useful in this disease.

PLEURO-PNEUMONIA.

This disease, as its name implies, is an inflammatory condition of the lungs and the *pleura*, or the enveloping membrane of the lungs and the lining membrane of the chest. It is sometimes called contagious, infectious, and epizoötic pleuro-pneumonia,—contagious or infectious, from its supposed property of transmission from the diseased to the healthy animal.

A contagious character the author is not ready to assign to it,—contagious, as he understands it, being strictly applicable to those diseases which depend upon actual contact with the poison that it may be communicated from one animal to another. This does not necessarily imply the actual touching of the animals themselves; for it may be communicated from the poison left in the trough, or other places where the diseased animal has been brought in contact with some object, as is often the case in glanders in the horse; the matter discharged from the nose, and left upon the manger, readily communicating


TAKING AN OBSERVATION.

that disease to healthy animals coming in contact with it. Contagious diseases, therefore, travel very slowly, starting, as they do, at one point, and gradually spreading over a large district, or section of country.

This disease is, however, regarded by the author as infectious; by which term is meant that it is capable of being communicated from the diseased to the healthy animal through the medium of the air, which has become contaminated by the exhalations of poisonous matter. The ability to inoculate other animals in this way is necessarily confined to a limited space, sometimes not extending more than a few yards. Infectious diseases, accordingly, spread with more rapidity than contagious ones, and are, consequently, more to be dreaded; since we can avoid the one with comparatively little trouble, while the other often steals upon us when we regard ourselves as beyond its influence, carrying death and destruction in its course.

The term by which this disease is known, is a misnomer. Pleuro-pneumonia proper is neither a contagious, nor an infectious disease; hence, the denial of medical men that this so-called pleuro-pneumonia is a contagious, or infectious disease, has been the means of unnecessarily exposing many animals to its poisonous influence.

In the *Recuêil de Médêcine Vêtêrinaire,* for 1833, will be found a very interesting description of this fatal malady. The author, M. Lecoy, Assistant Professor at the Veterinary School of Lyons, France, says: "There are few districts in the *arrondissement* of Avesnes where more cattle are fattened than in that of Soire-le-Chateau. The farmers being unable to obtain a sufficient supply of cattle in the district, are obliged to purchase the greater part of them from other provinces; and they procure a great number for grazing from Franche Comté. The cattle of this country are very handsome; their forms are compact; they fatten rapidly; and they are a kind of cattle from which the grazer would derive most advantage, were it not that certain diseases absorb, by the loss of some of the animals, the profits of the rest of the herd. Amongst the diseases which most frequently attack the cattle which are brought from the North, there is one very prevalent in some years, and which is the more to be dreaded as it is generally incurable; and the slaughter of the animal, before he is perceptibly wasted, is the only means by which the farmer can avoid losing the whole value of the beast.

"This disease is chronic pleuro-pneumonia. The symptoms are scarcely recognizable at first, and often the beast is ill for a long time without its being perceived. He fattens well, and when he is slaughtered the owner is astonished to find scarcely half of the lungs capable of discharging the function of respiration. When, however, the ox has not sufficient strength of constitution to resist the ravages of disease, the first symptom which is observed is diminution, or irregularity of appetite. Soon afterwards, a frequent, dry cough is heard, which becomes feeble and painful as the disease proceeds. The dorso-lumbar portion of the spine (loins) grows tender; the animal flinches when the part is pressed upon, and utters a peculiar groan, or grunt, which the graziers regard as decisive of the malady.

"Quickly after this, the movements of the flanks become irregular and accelerated, and the act of respiration is accompanied by a kind of balancing motion of the whole body. The sides of the chest become as tender as the loins, or more so; for the animal immediately throws himself down, if pressed upon with any force. The elbows become, in many subjects, more and more separated from the sides of the chest. The pulse is smaller than natural, and not considerably increased. The muzzle is hot and dry, alternately. The animal lies down as in a healthy state, but rumination is partially or entirely suspended. The *fœces* are harder than they should be; the urine is of its natural color and quantity; the mouth is often dry; and the horns and ears retain their natural temperature.

"This first stage of the disease sometimes continues during a month, or more, and then, if the animal is to recover, or at least, apparently so, the symptoms gradually disappear. First of all, the appetite returns, and the beast begins to acquire a little flesh. The proprietor should then make haste and get rid of him; for it is very rare that the malady, however it may be palliated for a while, does not reappear with greater intensity than before.

"In most cases, the disease continues to pursue its course toward its termination without any remission,—every symptom gradually increasing in intensity. The respiration becomes more painful; the head is more extended; the eyes are brilliant; every expiration is accompanied with a grunt, and by a kind of puckering of the angles of the lips; the cough becomes smaller, more suppressed, and more painful; the tongue protrudes from the mouth, and a frothy mucus is abundantly discharged; the breath becomes offensive; a purulent fluid of a bloody color escapes from the nostrils;

diarrhœa, profuse and fetid, succeeds to the constipation; the animal becomes rapidly weaker; he is a complete skeleton, and at length he dies.

"Examination after death discloses slight traces of inflammation in the intestines, discoloration of the liver, and a hard, dry substance contained in the manyplus. The lungs adhere to the sides and to the diaphragm by numerous bands, evidently old and very firm. The substance of the lungs often presents a reddish-gray hepatization throughout almost its whole extent. At other times, there are tubercles in almost every state of hardness, and in that of suppuration. The portion of the lungs that is not hepatized is red, and gorged with blood. Besides the old adhesions, there are numerous ones of recent date. The pleura is not much reddened, but by its thickness in some points, its adhesion in others, and the effusion of a serous fluid, it proves how much and how long it has participated in the inflammatory action. The trachea and the bronchia are slightly red, and the right side of the head is gorged with blood.

"In a subject in which, during life, I could scarcely feel the beating of the heart, I found the whole of the left lobe of the lungs adhering to the sides, and completely hepatized. In another, that had presented no sign of disease of the chest, and that for some days before his death vomited the little fodder which he could take, the whole of that portion of the œsophagus that passed through the chest was surrounded with dense false membranes, of a yellowish hue, ranging from light to dark, and being in some parts more than an inch in thickness, and adhering closely to the muscular membrane of the tube, without allowing any trace to be perceived of that portion of the mediastinal pleura on which this unnatural covering was fixed and developed.

"The cattle purchased in Franche Comté are brought to Avesnes at two periods of the year—in autumn and in the spring. Those which are brought in autumn are much more subject to the disease than those which have arrived in the spring; and it almost always happens that the years in which it shows itself most generally are those in which the weather was most unfavorable while the cattle were on the road. The journey is performed by two different routes,—through Lorraine and through Champagne,—and the disease frequently appears in cattle that have arrived by one of these routes. The manner in which the beasts are treated, on their arrival, may contribute not a little to the development of the malady. These animals, which have been driven long distances in bad weather, and frequently half starved, arrived famished, and therefore the more fatigued, and some of them lame. Calculating on their ravenous appetite, the graziers, instead of giving them wholesome food, make them consume the worst that the farm contains,—musty and mouldy fodder; and it is usually by the cough, which the eating of such food necessarily produces, that the disease is discovered and first developed.

"Is chronic pleuro-pneumonia contagious? The farmers believe that it is, and I am partly of their opinion. When an animal falls sick in the pasture, the others, after his removal, go and smell at the grass where he has lain, and which he has covered with his saliva, and, after that, new cases succeed to the first. It is true that this fact is not conclusive, since the disease also appears in a great number of animals that have been widely separated from each other. But I have myself seen three cases in which the cattle of the country, perfectly well before, have fallen ill, and died with the same symptoms, excepting that they have been more acute, after they have been kept with cattle affected with this disease. This circumstance inclines me to think that the disease is contagious; or, at least, that, in the progress of it, the breath infects the cow-house in which there are other animals already predisposed to the same disease. I am induced to believe that most of the serious internal diseases are communicated in this manner, and particularly those which affect the organs of respiration, when the animals are shut up in close, low, and badly-ventilated cow-houses." [*Rec. de Méd. Vét. Mai*, 1833.]

No malady can be more terrible and ruinous than this among dairy-stock; and its spread all over the country, together with its continuance with scarcely any abatement, must be attributed to the combination of various causes. The chief are: *first*, the very contagious or infectious nature of the disorder; *second*, inattention on the part of Government to the importation and subsequent sale of diseased animals; and, *third*, the recklessness of purchasers of dairy or feeding cattle.

This disease may be defined as an acute inflammation of the organs of the chest, with the development of a peculiar and characteristic poison, which is the active element of infection or contagion. It is a disease peculiar to the cattle tribe, notwithstanding occasional assertions regarding observations of the disease among horses, sheep, and other animals,—which pretended observations have not been well attested.

The infectious, or contagious nature of this virulent malady is incontestibly substantiated by an overwhelming amount of evidence, which cannot be adduced at full length here, but which may be classified under the following heads: *first*, the constant spreading of the disease from countries in which it rages to others which, previously to the importation of diseased animals, had been perfectly free from it. This may be proved in the case of England, into which country it was carried in 1842, by affected animals from Holland. Twelve months after, it spread from England to Scotland, by means of some cattle sold at All-Hallow Fair, and it was only twelve months afterward that cattle imported as far north as Inverness took the disease there. Lately, a cow taken from England to Australia was observed to be diseased upon landing, and the evil results were limited to her owner's stock, who gave the alarm, and ensured an effectual remedy against a wider spread. Besides, the recent importation of pleuro-pneumonia into the United States from Holland appears to have awakened our agricultural press generally, and to have convinced them of the stubborn fact that our cattle have been decimated by a fearfully infectious, through probably preventable, plague. A letter from this country to an English author says: "Its (pleuro-pneumonia's) contagious character seems to be settled beyond a doubt, though some of the V. S. practitioners deny it, which is almost as reasonable as it would be to deny any other well-authenticated historic fact. Every case of the disease is traceable to one of two sources; either to Mr. Chenery's stock in Belmont (near

Boston, Massachusetts), into which the disease was introduced by his importation of four Dutch cows from Holland, which arrived here the 23d of last May; or else to one of the three calves which he sold to a farmer in North Brookfield, Massachusetts, last June."

2dly. Apart from the importation into countries, we have this certain proof—to which special attention was drawn several years ago—that cattle-dealers' farms, and public markets, constitute the busy centres of infection. Most anxious and careful inquiries have established the proposition that in breeding-districts, where the proprietors of extensive dairies—as in Dumfries, Scotland, and other places—abstain from buying, except from their neighbors, who have never had diseases of the lungs amongst their stock, pleuro-pneumonia has not been seen. There is a wide district in the vicinity of Abington, England, and in the parish of Crawford, which has not been visited by this plague, with the exception of two farms, into which market-cattle had been imported and thus brought the disease.

3dly. In 1854 appeared a Report of the Researches on Pleuro-Pneumonia, by a scientific commission, instituted by the Minister of Agriculture in France. This very able pamphlet was edited by Prof. Bouley, of Alfort, France. The members of the commission belonged to the most eminent veterinarians and agriculturists in France. Magendie was President; Regnal, Secretary; besides Rayer, the renowned comparative pathologist; Yvart, the Inspector-General of the Imperial Veterinary Schools; Renault, Inspector of the Imperial Veterinary Schools; Delafond, Director of Alfort College; Bouley, Lassaigne, Baudemont, Doyére, Manny de

Morny, and a few others representing the public. If such a commission were occasionally appointed in this country for similar purposes, how much light would be thrown on subjects of paramount importance to the agricultural community!

Conclusions arrived at by the commission are too important to be overlooked in this connection. The reader must peruse the Report itself, if he needs to satisfy himself as to the care taken in conducting the investigations: but the foregoing names sufficiently attest the indisputable nature of the facts alluded to.

In instituting its experiments, the commission had in view the solving of the following questions:—

1*stly*. Is the epizoötic pleuro-pneumonia of cattle susceptible of being transmitted from diseased to healthy animals by cohabitation?

2*dly*. In the event of such contagion's existing, would all the animals become affected, or what proportion would resist the disease?

3*dly*. Amongst the animals attacked by the disease, how many recover, and under what circumstances? How many succumb?

4*thly*. Are there any animals of the ox species decidedly free from any susceptibility of being affected from the contagion of pleuro-pneumonia?

5*thly*. Do the animals, which have been once affected by a mild form of the disease, enjoy immunity from subsequent attacks?

6*thly*. Do the animals, which have once been affected by the disease in its active form, enjoy such immunity?

To determine these questions, the commission submitted at different times to the influence of cohabitation with diseased animals forty-six perfectly healthy ones, chosen from districts in which they had never been exposed to a similar influence.

Of these forty-six animals, twenty were experimented on at Pomeraye, two at Charentonneau, thirteen at Alfort, and eleven, in the fourth experiment, at Charentonneau.

Of this number, twenty-one animals resisted the disease when first submitted to the influence of cohabitation, ten suffered slightly, and fifteen took the disease. Of the fifteen affected, four died, and eleven recovered. Consequently, the animals which apparently escaped the disease at the first trial amounted to 45.65 per cent., and those affected to 21.73 per cent. Of these, 23.91 per cent. recovered, and 8.69 per cent. died. But the external appearances in some instances proved deceptive, and six of the eleven animals of the last experiment, which were regarded as having escaped free, were found, on being destroyed, to bear distinct evidence of having been affected. This, therefore, modifies the foregoing calculations, and the numbers should stand thus :—

15 enjoy immunity,	or	32.61	per cent.
10 indisposed,	“	21.73	“
17 animals cured,	“	36.95	“
4 dead,	“	8.98	“

Of the forty-two animals which were exposed in the first experiments at Pomeraye and Charentonneau, and which escaped either without becoming affected, or recovering, eighteen were submitted to a second trial; and of these eighteen animals, five had, in the first experiment, suffered from the disease and had recovered; five had now become affected; and four had been indisposed. The four animals submitted to the influence of contagion a third time, had been affected on the occasion of the first trial. None of the eighteen animals contracted the disease during these renewed exposures to the influence of contagion.

From the results of these experiments, the commission drew the following conclusions:—

1*stly*. The epizoötic pleuro-pneumonia is susceptible of being transmitted from diseased to healthy animals by cohabitation.

2*dly*. All the animals exposed do not take the disease; some suffer slightly, and others not at all.

3*dly*. Of the affected animals, some recover and others die.

4*thly*. The animals, whether slightly or severely affected, possess an immunity against subsequent attacks.

These are the general conclusions which the commission deemed themselves authorized to draw from their experiments. The absolute proportion of animals which become affected, or which escape the disease, or of those which die and which recover, as a general rule, cannot be deduced from the foregoing experiments, which, for such a purpose, are too limited. The commission simply state the numbers resulting from their experiments. From these it transpires that forty-five of the animals became severely affected with pleuro-pneumonia, and twenty-one per cent. took the disease slightly, making the whole sixty-six per cent. which were more or less severely attacked. Thirty-four per cent. remained free from any malady. The proportion of animals which re-acquired their wonted appearance of health amounted to eighty-three per cent., whereas seventeen per cent. died. Many minor points might be insisted on, but it is sufficient here to say, that the most careful analysis of all facts has proved to practical veterinarians, as well as to experienced agriculturists, and must prove to all who will calmly and dispassionately consider the point, that pleuro-pneumonia is pre-eminently an infectious, or contagious disease.

Symptoms.—From the time that an animal is exposed to the contagion to the first manifestation of symptoms, a certain period elapses. This is the period of incubation. It varies from a fortnight to forty days, or even several months. The first signs, proving that the animal has been seized, can scarcely be detected by any but a professional man; though, if a proprietor of cattle were extremely careful, and had pains-taking individuals about his stock, he would invariably notice a slight shiver as ushering in the disorder, which for several days, even after the shivering fit, would limit itself to slight interference in breathing, readily detected on auscultation. Perhaps a cough might be noticed, and that the appetite and milk-secretion diminished. The animal becomes costive, and the shivering fits recur. The cough becomes more constant and oppressive; the pulse full and frequent, usually numbering about eighty per minute at first, and rising to upwards of one hundred. The temperature of the body rises, and all the symptoms of

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acute fever set in. A moan, or grunt, in the early part of the disease indicates a dangerous attack, and the *alae nasi* (cartilages of the nose) rise spasmodically at each inspiration; the air rushes through the inflamed windpipe and bronchial tubes, so as to produce a loud, coarse respiratory murmur; and the spasmodic action of the abdominal muscles indicates the difficulty the animal also experiences in the act of expiration. Pressure over the intercostal (between the ribs) spaces, and pressing on the spine, induce the pain so characteristic of pleurisy, and a deep moan not infrequently follows such an experiment. The eyes are bloodshot, mouth clammy, skin dry and tightly bound to the subcutaneous textures, and the urine is scanty and high-colored.

Upon auscultation, the characteristic dry, sonorous *râle* of ordinary bronchitis may be detected along the windpipe, and in the bronchial tubes. A loud sound of this description is, not infrequently, detected at the anterior part of either side of the chest; whilst the respiratory murmur is entirely lost, posteriorly, from consolidation of the lungs. A decided leathery, frictional sound is detected over a considerable portion of the thoracic surface. As the disease advances, and gangrene, with the production of cavities in the lungs, ensues, loud, cavernous *râles* are heard, which are more or less circumscribed, occasionally attended by a decided metallic noise. When one lobe of the lungs is alone affected, the morbid sounds are confined to one side, and on the healthy side the respiratory murmur is uniformly louder all over.

By carefully auscultating diseased cows from day to day, interesting changes can be discovered during the animal's lifetime. Frequently, the abnormal sounds indicate progressive destruction; but, at other times, portions of the lungs that have been totally impervious to air, become the seat of sibilant *râles*, and gradually, a healthy respiratory murmur proves that, by absorption of the materials which have been plugging the tissues of the lungs, resolution is fast advancing. Some very remarkable cases of this description have been encountered in practice.

Unfortunately, we often find a rapid destruction of the tissues of the lungs, and speedy dissolution. In other instances, the general symptoms of hectic, or consumption, attend lingering cases, in which the temperature of the body becomes low, and the animal has a dainty appetite, or refuses all nourishment. It has a discharge from the eyes, and a fetid, sanious discharge from the nose. Not infrequently, it coughs up disorganized lung-tissue and putrid pus. Great prostration, and, indeed, typhus symptoms, set in. There is a fetid diarrhœa, and the animal sinks in the most emaciated state, often dying from suffocation, in consequence of the complete destruction of the respiratory structures.

Post mortem appearances.—In acute cases, the cadaverous lesions chiefly consist in abundant false membranes in the trachea, or windpipe, and closure of the bronchial tubes by plastic lymph. The air-vesicles are completely plugged by this material, and very interesting specimens may be obtained by careful dissection, in the shape of casts of the bronchial tubes and air-vesicles, clustered together like bunches of grapes. On slicing the lungs in these cases, hepatization is observed, presenting a very peculiar appearance, which is, in a great measure, due to the arrangement of the lung-tissue in cattle. The pulmonary lobules are of a deep-red or brown color, perfectly consolidated, and intersected or separated, one from the other, by lighter streaks of yellowish-red lymph, occupying the interlobular, areolar tissue. In the more chronic cases, the diseased lobes and lobules are found partly separated from the more healthy structures.

This occurs from gangrene, and putrefactive changes, or in some instances, from the ulcerative process, so constantly observed in the segregation of dead from living tissues. Abscesses are not infrequently found in different parts of the lungs. Sometimes circumscribed, at others connected with bronchial tubes, and not infrequently communicating with the pleural cavity. True empyema is not often seen; but, at all times, the adhesions between the costal and visceral pleura are extensive, and there is much effusion in the chest. In dressed carcasses of cows that have been slaughtered from pleuro-pneumonia, even though the disease has not been far advanced, it will be found that the butcher has carefully scraped the serous membrane off the inner surface of the ribs, as it would otherwise be impossible for him to give the pleura its healthy, smooth aspect, from the firm manner in which the abundant false membranes adhere to it. The direased lungs sometimes attain inordinate weight. They have been known to weigh as much as sixty pounds.

Treatment.—The veterinary profession is regarded by many who have sustained heavy losses from pleuro-pneumonia, as deeply ignorant, because its members cannot often cure the disease. Persons forget that there are several epidemics which prove equally difficult to manage on the part of the physician, such as cholera, yellow fever, etc. The poison in these contagious, epizoötic diseases is so virulent that the animals may be regarded as dead from the moment they are attacked. Its elimination from the system is impossible, and medicine cannot support an animal through its tardy, exhausting, and destructive process of clearing the system of so potent a virus. All antiphlogistic means have failed, such as blood-letting and the free use of evacuants. Derivatives, in the form of mustard-poultices, or more active blisters, are attended with good results. Stimulants have proved of the greatest service; and the late Prof. Tessona, of Turin, strongly recommended, from the very onset of the disease, the administration of strong doses of quinine. Maffei, of Ferrara, states that he has obtained great benefit from the employment of ferruginous tonics and manganese in the very acute stage of the malady, supported by alcholic stimulants. Recently, the advantages resulting from the use of sulphate of iron, both as a preventive and curative, have been exhibited in France. It would appear that the most valuable depurative method of treatment yet resorted to is by the careful use of the Roman bath. Acting, like all other sudorifics in cases of fever and blood diseases, it carries off by the skin much of the poison, without unduly lowering the vital powers.

Prevention.—The rules laid down in Denmark, and indeed in many other places, appear the most natural for the prevention of the disease. If they could be carried out, the disease must necessarily be stopped; but there are practical and insuperable difficulties in the way of enforcing them. Thus, a Dr. Warneke says, prevention consists in "the avoidance of contagion; the slaughter of infected beasts; the prohibition of keeping cattle by those whose cattle have been slaughtered, for a space of ten weeks after the last case occurring; the disinfection of stalls vacated by slaughtering; the closing of infected places to all passing of cattle; especial attention to the removal of the dung, and of the remains of the carcasses of slaughtered beasts; and, finally, undeviating severity of the law against violators."

Dr. Williams, of Hasselt, suggested and carried out, in 1851, the inoculation of the virus of pleuro-pneumonia, in order to induce a mild form of the disease in healthy animals, and prevent their decimation by the severe attacks due to contagion. He met with much encouragement, and perhaps more opposition. Didot, Corvini, Ercolani, and many more accepted Dr. Williams's facts as incontestable, and wrote, advocating his method of checking the spread of so destructive a plague.

The first able memoir which contested all that has been said in favor of inoculation, appeared in Turin, and was written by Dr. Riviglio, a Piedmontese veterinary surgeon. This was supported by the views of many others. Prof. Simonds wrote against the plan, and, in 1854, the French commission, whose report has been before mentioned, confirmed, in part, Riviglio's views, though, from the incompleteness of the experiments, further trials were recommended.

Inoculation is performed as follows: A portion of diseased lung is chosen, and a bistoury or needle made to pierce it so as to become charged with the material consolidating the lung, and this is afterward plunged into any part, but, more particularly, toward the point of the tail. If operated severely, and higher up, great exudation occurs, which spreads upward, invades the areolar tissue round the rectum and other pelvic organs, and death soon puts an end to the animal's excruciating suffering. If the operation is properly performed with lymph that is not putrid, and the incisions are not made too deep, the results are limited to local exudation and swelling, general symptoms of fever, and gradual recovery. The most common occurrence is sloughing of the tail; and in London, at the present time, dairies are to be seen in which all the cows have short-tail stumps.

Dr. Williams and others have gone too far in attempting to describe a particular corpuscle as existing in the lymph of pleuro-pneumonia. All animal poisons can be alone discovered from their effects. In structure and chemical constitution, there is no difference, and often the most potent poisons are simple fluids. The Belgian Commission, appointed to investigate the nature and influence of inoculation for pleuro-pneumonia, very justly expressed an opinion that Dr. Williams had not proved that a specific product, distinguished by anatomical characters, and appreciable by the microscope, existed in this disease.

The all-important question, "Is inoculation of service?" has to the satisfaction of most been solved. The Belgian and French commissions, the observations of Riviglio, Simond, Herring, and many others, prove that a certain degree of preservative influence is derived by the process of inoculation. It does not, however, arrest the progress of the disease. It certainly diminishes to some extent—though often very slightly so—the number of cases, and, particularly, of severe ones. This effect has been ascribed to a derivative action, independent of any specific influence, and, indeed, similar to that of introducing setons in the dewlap.

In London, some dairymen have considerable faith in inoculation, though its effect is uncertain, and the manner of its working a mystery. The best counsel, in the premises, which can be given to the keeper of dairy stock is, to select his own animals from healthy herds, and strictly to avoid public markets. In many instances, a faithful observance of these injunctions has been sufficient to prevent the invasion of this terrible disease. [Gamgee.]

The existence of this disease in the United States was not generally known until the year 1859, when Mr. Chenery, of Belmont, near Boston, Massachusetts, imported several cows from Holland, which arrived in the early part of the spring of that year. Some of the animals were sick when they arrived, but the true nature of the disease was not at that time suspected. Several of them were so bad that they were carried in trucks to Mr. Chenery's barn. Some two months passed away before the character of the disease was discovered.

Upon the facts becoming known, the citizens of Massachusetts became panic-stricken, as the disease was rapidly spreading over that State. An extra session of the Legislature was speedily convened, when a Joint Special Committee was appointed, to adopt and carry out such measures as in their judgment seemed necessary for the extirpation of this monster, pleuro-pneumonia.

The Committee met in the Hall of the House of Representatives, Thursday, May, 31, 1860, to receive evidence as to the contagious or infectious character of the disease, in order to determine concerning the necessity of legislative action.

Mr. Walker, one of the commissioners appointed by the Governor, made the following statement: "The disease was introduced into North Brookfield from Belmont. Mr. Curtis Stoddard, a young man of North Brookfield, went down, the very last of June, last year, and purchased three calves of Mr. Chenery, of Belmont. He brought these calves up in the cars to Brookfield. On their way from the depôt to his house, about five miles, one of the calves was observed to falter, and when he got to his house, it seemed to be sick, and in two or three days exhibited very great illness; so much so, that his father came along, and, thinking he could take better care of it, took the calf home. He took it to his own barn, in which there were about forty head of cattle; but it grew no better, and his son went up and brought it back again to his own house. In about ten days after that, it died. His father, who had had the calf nearly four days, in about a fortnight afterward observed that one of his oxen was sick, and it grew worse very fast and died. Two weeks after, a second also sickened, and died. Then a third was attacked and died, the interval growing wider from the attack of one animal to that of another, until he had lost eight oxen and cows. Young Stoddard lost no animal by the infection,—that is, no one died on his hands. Prior to the appointment of this Commission, about the first of November,—for reasons independent of this disease, which I don't suppose he then knew the nature of,—he sold off his stock. He sold off eleven heifers, or young animals, and retained nine of the most valuable himself; which shows that he did not then know any thing was the matter with them.

"These nine were four oxen, and five young cattle. The four he took to his father's, three of the others to his uncle's, and the remaining two to his father-in-law's; distributing them all among his friends,—which furnishes another proof that he did not suppose he was doing any mischief. He disposed of his herd in that way. From this auction, these eleven animals went in different directions, and wherever they went, they scattered the infection. Without a single failure the disease has followed those cattle; in one case, more than two hundred cattle having been infected by one which was sold at Curtis Stoddard's auction, when he was entirely ignorant of the disease.

"When the commission was appointed, they went and examined his cattle, and were satisfied that they were diseased, —at least, some of them. They examined his father's herd, and found that they were very much diseased; and when we came to kill Curtis Stoddard's cattle, seven of the nine head were diseased. Two were not condemned, because the law says, 'Cattle not appearing to be diseased, shall be appraised.' Nevertheless, it proved that these animals were diseased; so that his whole herd was affected.

"In regard to Leonard Stoddard's cattle, he lost fourteen of his animals before the commissioners went to his place. They took eighteen more, all of which were diseased,—most of them very bad cases,—indeed, extreme cases. That left eight heads, which were not condemned, because not appearing to be diseased. Here I remark, that when this disease is under the shoulder-blade, it cannot be detected by percussion. The physicians did not say that the animal was not diseased, but that they did not see sufficient evidence upon which to condemn. Such animals were to be paid for, upon the ground of their not appearing to be diseased. Nevertheless, it is proper to state that the remaining eight which were not condemned, were suspected to be diseased, and we told Mr. Stoddard that we had the impression that they were diseased, notwithstanding appearances. He said, 'There is a three-year-old animal that has never faltered at all. She has never manifested the slightest disease. If you will kill her, and she is diseased, I shall make up my mind that I have not a well animal in my stalls.' We killed the animal, and found her to be badly diseased.

"Thus, the first two herds were all infected by the disease; and in the last of Curtis Stoddard's oxen which we killed, we found a cyst in the lungs of each. One of these lungs is now in this building, never having been cut open, and medical men can see the cyst which it contains. I have said in what manner Mr. Curtis Stoddard's cattle spread the infection.

"In regard to Mr. Leonard Stoddard's: in the first place, he kept six or eight oxen which he employed in teaming. He was drawing some lumber, and stopped over night, with his oxen, at Mr. Needham's. Needham lost his whole herd. He lost eight or ten of them, and the rest were in a terrible condition. Seven or eight more were condemned, and his whole herd was destroyed, in consequence of Mr. Stoddard's stopping with him over night. Mr. Stoddard sold an animal to Mr. Woodis of New Braintree. He had twenty-three fine cows. It ruined his herd utterly. Seven or eight animals died before the commissioners got there. Mr. L. Stoddard also sold a yoke of cattle to Mr. Olmstead, one of his neighbors, who had a very good herd. They stayed only five days in his hands, when they passed over to Mr. Doane. In these five days they had so infected his herd that it was one of the most severe instances of disease that we have had. One third were condemned, and another third were passed over as sound, whether they were so, or not. They did not appear to be diseased. The cattle that were passed from Mr. Stoddard through Mr. Olmstead to Mr. Doane, were loaned by Mr. D. to go to a moving of a building from Oakham to New Braintree. They were put in with twenty-two yoke of cattle, and employed a day and a half. It has since been proved that the whole of these cattle took the contagion. They belonged to eleven different herds, and of course, each of these herds formed a focus from which the disease spread. Now, in these two ways the disease has spread in different directions.

"But, when the commissioners first commenced, they had no idea that the disease extended further than those herds in which there were animals sick. Hence, their ideas and the ideas of those who petitioned for the law, did not extend at all to so large a number of herds as have since been proved to be diseased, because they only judged of those who manifested disease. As soon as we began in that circle, we found a second circle of infection, and another outside of that; and by that time it had branched off in various directions to various towns. It assumed such proportions that it was very evident that the commissioners had not the funds to perform the operations required by the law. The law confines the commissioners to one operation,—killing and burying. No discretionary power is given at all. The commissioners became entirely dissatisfied with that condition of things, because other measures besides merely killing and burying, are quite as necessary and important. When they arrived at that point and discovered to what extent the infection had spread, they stopped killing the herds, and I believe there has not been a herd killed for twenty days.

"The policy was then changed to circumscribing the disease, by isolating the herds just as fast as possible and as surely as possible. A man's herd has been exposed. There is no other way than to go and examine it, and take the diseased animals away. Then he knows the animals are diseased, and his neighbors know it. That has been the business of the commissioners for the last twenty days; and the facts that they have no discretionary power whatever, and that they were entirely circumscribed in their means, and that it was hard for the farmers to lose their stock and not be paid for it,—induced them to petition the Governor, in connection with the Board of Agriculture, for the calling of a session of the Legislature, to take measures for the extinction of the disease."

In response to a question, "Whether any animals that had once been affected, had afterward recovered?"—the same gentleman stated that instances had occurred where cattle had been sick twice, and had, apparently, fully recovered; they ruminated readily, and were gaining flesh. Upon examination, however, they were pronounced diseased, and, when killed, both lungs were found in a hopeless case, very badly diseased.

Dr. George B. Loring, another of the commissioners, stated that eight hundred and forty-two head of cattle had, at that time, been killed, and that, from a careful estimate, there still remained one thousand head, which should either be killed, or isolated for such a length of time as should establish the fact that they had no disease about them. Twenty thousand dollars and upwards had already been appraised as the value of the cattle then killed.

As to disinfecting measures, the farmers who had lost cattle were requested to whitewash their barns thoroughly, and some tons of a disinfecting powder were purchased for the advantage of the persons who wished to use it. An early application was advised, that the barns might be in readiness for hay the then coming season.

The practice adopted by the commissioners was, to appraise the cattle whenever a herd was found which had been exposed, and a surgeon was appointed to pass judgment upon the number of diseased animals. After that judgment, the remaining animals that were pronounced sound were killed, and passed to the credit of the owner, after an appraisement made by these persons. The fair market-prices were paid, averaging about thirty-three dollars a head. At the time of the meeting of the committee, some seventy cattle had died of the disease.

An examination was made of some of the animals killed, and the following facts obtained :—

Case 1.—This cow had been sick for nineteen days; was feeble, without much appetite, with diarrhœa, cough, shortness of breathing, hair staring, etc. Percussion dull over the whole of the left side of the chest; respiration weak. Killed by authority. Several gallons of serum were found in the left side of the chest; a thick, furzy deposit of lymph over all the *pleura-costalis.* This lymph was an inch in thickness, resembling the velvety part of tripe, and quite firm. There was a firm deposit of lymph in the whole left lung, but more especially at its base, with strong adhesions to the diaphragm and *pleura-costalis* near the spine. The lung was hard and brittle, like liver, near its base. No pus. Right lung and right side of chest healthy.

Case 2.—This cow was taken very sick, January 30th. In fourteen days, she began to get better. April 12th, she is gaining flesh, breathes well, hair healthy, gives ten quarts of milk a day, and in all other respects bids fair for a healthy animal hereafter, except a slight cough. Percussion dull over base of the left lung, near the spine, and respiration feeble in the same regions.

Autopsy.—Left lung strongly adherent to diaphragm and costal pleura; the long adhesions well smoothed off; *pleura-costalis* shining and healthy. Also, the surface of the lung, when there were no adhesions, sound and right; all the lung white, and free for the entrance of air, except the base, in which was a cyst containing a pint or two of pus. Loose in this pus was a hard mass, as large as a two-quart measure, looking like marble; when cut through its centre, it appeared like the brittle, hardened lining in case 1. It appeared as though a piece of lung had been detached by suppuration and enclosed in an air-tight cyst, by which decomposition was prevented. The other lung and the chest were sound. It is to be inferred, as there were adhesions, that there had been pleurisy and deposit of lymph and serum, as in case 1, and that Nature had commenced the cure by absorbing the serum from the chest, and the lymph from the free pleural surface, and smoothed off every thing to a good working condition.

The lump in the cyst was brittle and irregular on its surface, as though it was dissolving in the pus. No good reason can be given why Nature should not consummate the work which she had so wisely begun.

Case 3.—This cow had been sick fourteen days; was coughing and breathing badly; percussion dull over both chests, and respiration feeble. Killed.

Autopsy.—Both chests filled with water; deposits of lymph over all the *pleura-costalis*, presenting the same velvety, furzy appearance as in Case 1. Both lungs were hardened at the base, and the left throughout its whole extent, and firmly adherent to diaphragm and costal pleura, near the spine. The right lung had nearly one-third of its substance in a condition for the entrance of air; but this portion, even, was so compressed with the water, that a few hours longer would have terminated the case fatally without State aid. This case had not proceeded far enough for the formation of the cyst or pus.

In Mr. Needham's herd, about twenty-eight days intervened between the first and second case of disease, instead of about fourteen, as in Mr. Olmstead's.

Case 4.—A nice heifer, in fair condition, eating well, only having a slight cough. Percussion dull over base of the left lung.

Autopsy.—Base of left lung adherent to diaphragm and costal pleura; lung hardened. On cutting into base, found ulceration and a head of Timothy grass, four or five inches long. Animal in every other way well.

Case 5.—This cow was taken, January 1st, with a cough, difficulty of breathing, and the other symptoms of the disease, and continued sick till March 1st. On taking her out, April 12th, to be slaughtered, she capered, stuck up her tail, snuffed, and snorted, showing all the signs of feeling well and vigorous.

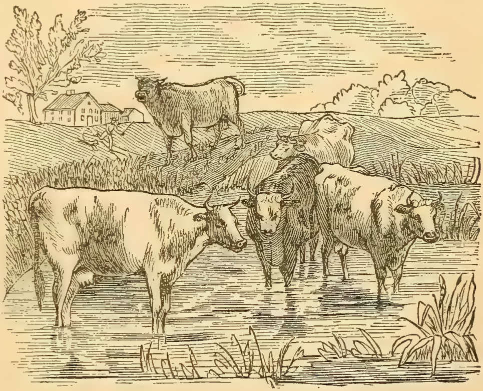
Autopsy.—Right lung firmly adherent to diaphragm and costal pleura, near the spine. Base of lung hardened, containing a cyst with a large lump, of the size of a two-quart measure, floating in pus; outside of the lump was of a dirty yellow-white, irregular, brittle, and cheesy; the inside mottled, or divided into irregular squares; red like muscle, and breaking under the finger, like liver. Costal pleura smooth, shining; adhesions where there was motion; card-like and polished; no serum; lung apparently performing its functions well, except for a short distance above the air-tight cyst, where it was still hardened. It would seem as though Nature was intending to dissolve this lump, and carry it off by absorption. She knows how, and would have done it, in the opinion of the writer, had she been allowed sufficient time.

Case 6.—Was taken December 18th, and was very sick; in three weeks she was well, except a cough, quite severe, and so continued till about the first of March, when she coughed harder and grew worse till seven days before she was killed, April 12th, when she brought forth a calf, and then commenced improving again.

Autopsy.—Right lung adherent to diaphragm and costal pleura. At its base, was a flabby, fluctuating cyst. In cutting into it, the lump was found to be breaking up by decomposition, and scenting badly. Every thing else normal. Was not the cyst broken through by some accident, thus letting in the air, when she grew worse? Would she not, probably, have overcome this disagreeable accident, and recovered, in spite of it? This cow's hair did not look well, as did that of those in which the cyst was air-tight; but still she was beginning to eat well again, and appeared in a tolerable way for recovery.

Case 7.—This heifer had coughed slightly for six weeks, but the owner said he thought no one going into his herd would notice that any thing was the matter with her.

Autopsy.—Slight adhesions of lung to diaphragm. Near these adhesions are small cysts, of the size of a walnut, containing pus and cheesy matter; about the cysts a little way the lung was hardened, say for half an inch. There were several cysts, and they appeared as though the inflammation attacked only the different lobes of the lungs, leaving others healthy between,—Nature throwing out coagulable lymph around the diseased lobe, and forming thereby an air-tight cyst, cutting around the diseased lobe by suppuration, so that it could be carried off by absorption.



A RURAL SCENE.

In the herd to which this animal belonged, nine days after the first cow died, the second case occurred. First cow was sick five weeks. The time of incubation could not have been over six weeks,—probably not over three weeks. Of these cows, one improved in eight weeks, the other in three weeks.

Case 8.—This cow had been sick three weeks. Killed.

Autopsy.—Large quantities of serum in left chest; lung adherent, and hardened at base. On cutting into the hardened lung, one side of the lump was found separated from the lung, with pus between the lines of separation, and the forming coat of the cyst outside of the pus; the other side of the lump was part and parcel of the hardened lung which had not yet had time to commence separation. The costal pleura was covered with organized lymph to the thickness of an inch, with the usual characteristics. The right chest contained a small quantity of serum, and had several small, hardened red spots in that lung, with some tender, weak adhesions; but most of the right lung was healthy.

Case 9.—Sick four weeks. Killed.

Autopsy.—Right lung hardened at base; adherent to diaphragm and costal pleura; lump separated on one side only. Cyst beginning to form, outside of separation; pus between cyst and lump, but in a very small quantity.

These two cases settle the character of the lump, and the manner of the formation of the cyst; the lump being lung and lymph, cut out by suppuration,—the cyst being organized, smoothed off by suppuration, friction, etc.

Case 10.—Killed. Hair looked badly; but the cow, it was said, ate, and appeared well. This case, however, occurred in a herd, of which no reliable information, in detail, could be procured.

Autopsy.—Base of lung hardened, adherent to diaphragm; containing a cyst, in which was a lump, of the size of a quart measure, but little pus. This lump had air-tubes running through it, which were not yet cut off by suppuration; and in one place, the cyst was perforated by a bronchial tube, letting in the external air to the lump, which was undergoing disorganization, and swelling badly. When cut into, it did not prevent the red, mottled, organized appearance of those cases with air-tight cysts.

Quite a number of other cases were examined, but these ten present all the different phases. One or two cases are needed of an early stage of the disease, to settle the point, whether, in all cases, the primary disease is lung fever, and the pleurisy a continuation, merely, of the primary disease; together with some six or eight cases, during five, six, seven, eight months from attack, and so on till entire, final recovery. Some cases were sick almost a year since, and are now apparently quite well; perhaps all the lump and pus are not yet gone. Many practitioners think that no severe case will ever recover, and some think that none ever get entirely well. Others, however, can see no reason why, as a general rule, all single cases should not recover, and all double cases die.

The disease was the most fatal in Mr. Chenery's (the original) herd, although it was the best-fed and the warmest-stabled. He attributed the fatality, in part, to a want of sufficient ventilation. The other herds, in which all the fatal cases occurred in two hours, consisted, originally, one of forty-eight head, of which thirteen died, or were killed, to prevent certain death; of twenty-three head, of which seven died; of twenty-two head, of which eight died; of twenty-two head, of which eight also died; and of twenty-one head, of which four died. A little less than thirty per cent., therefore, of these herds died.

This estimate excludes the calves. Most of the cows which had not calved before being attacked, lost their calves prematurely. The probable time of incubation, as deduced from those Massachusetts cases, is from two to three weeks; of propagation, about the same time; the acute stage of the disease lasting about three weeks.

The author's attention was first directed to this disease, upon its appearance in Camden and Gloucester counties, New Jersey, in the year 1859, at about the same time it made its advent in Massachusetts. The singularity of this coincidence inclined him for the time to regard the disease as an epizoötic—having its origin in some peculiar condition of the atmosphere—rather than as a contagious, or infectious disease, which position was at that time assumed by him.

This opinion was strengthened by the fact, that no case occurring in New Jersey could be traced to a Massachusetts origin, in which State it was claimed that the disease never had existed in this country previous to its introduction there. It was, therefore, denied by the veterinary surgeons in the Eastern States, that the disease in New Jersey was the true European pleuro-pneumonia, but it was called by them the swill-milk disease of New York City, and it was assigned an origin in the distillery cow-houses in Brooklyn and Williamsburg.

In 1860 it found its way across the Delaware River into

Philadelphia, spreading very rapidly in all directions, particularly in the southern section of the county, known as The Neck,—many of the dairymen losing from one third to one half of their herds by its devastating influence. In order to save themselves—in part, at least—from this heavy loss, many of them, upon the first indications of the malady, sent their animals to the butcher, to be slaughtered for beef. In 1861 the disease found its way into Delaware, where its ravages were severely felt. So soon, however, as it became known that the disease was infectious or contagious, an effort was made to trace it to its starting-point; but, in consequence of the unwillingness of dairymen to communicate the fact that their herds were affected with pleuro-pneumonia, all efforts proved fruitless. In 1860 the disease found its way up the Delaware to Riverton, a short distance above the city of Philadelphia. A cattle-dealer, named Ward, turned some cattle into a lot, adjoining which several others were grazing. The residents of this place are chiefly the families of gentlemen doing business in the city, many of whom lost their favorite animals from this destructive malady.

The first case occurring at this place, to which the author's attention was called, was a cow belonging to Mr. D. Parrish, which had been exposed by coming in contact with Ward's cattle, had sickened, and died. An anxiety having been manifested to ascertain the cause of the death, the author made an examination of the animal, which, upon dissection, proved the disease to be a genuine case of the so-called pleuro-pneumonia. This examination was made August 20th, 1860, at the time of the Massachusetts excitement. Two cows, belonging to Mr. Rose, of the same place, had been exposed, and both had taken the disease. His attention having been called to them, he placed them under the author's treatment, and by the use of diffusible stimulants and tonics, one of these animals recovered, while the other was slaughtered for an examination, which revealed all the morbid conditions so characteristic of this disease.

The next case was a cow belonging to Mr. G. H. Roach, of the same place, which had been grazing in a lot adjoining that of Mr. Parrish. This cow was killed in the presence of Charles Wood, V.S., of Boston, Mass., and Arthur S. Copeman, of Utica, N. Y., who was one of a committee appointed by the New York State Agricultural Society for the purpose of investigating the disease. Both of these gentlemen having witnessed the disease in all its forms, as it appeared in Massachusetts, were the first to identify this case with those in that State.

Upon opening the cow, the left lung was found to be completely consolidated, and adhered to the left side, presenting the appearance usual in such cases. As she was with calf, the lungs of the fœtus were examined, disclosing a beautiful state of red hepatization.

The author's attention was next called to the herd of Mr. Lippincott, a farmer in the neighborhood, who had lost several cattle by the disease; but as he had been persuaded that treatment was useless, he abandoned the idea of attempting to save his stock in that way. From Riverton it soon spread to Burlington, some ten miles farther up the river, where it carried off large numbers of valuable cattle, and it continued in existence in that neighborhood for some time.

The disease was not then confined to these localities alone, but has spread over a large extent of country,—and that, too, prior to its appearance in Massachusetts, as will be shown by extracts from the following letters, published in the *Country Gentleman*:—

"We have a disease among the cattle here, I will class it under these names,—congestion of the lungs, terminating with consumption, or dropsy of the chest. Now, I have treated two cases; one five years since, as congestion,—and the first is still able to eat her allowance, and give a couple of pails of milk a day,—and the other, quite recently. The great terror of this disease is, that it is not taken in its first stages, which are the same in the cow as in the man—a difficulty in breathing, which, if not speedily relieved, terminates in consumption or dropsy. I have no doubt that consumption is contagious; but is that a reason why every one taken with congestion should be killed to check the spread of consumption? So I should reason, if I had pleuro-pneumonia in my drove of cattle. J. BALDWIN.

"NEWARK, N. J., June 11, 1860."

"I notice that a good deal of alarm is felt in different parts of the country about what is called the cattle-disease.

"From the diagnosis given in the papers, I have no doubt this is pleuro-pneumonia, with which I had some acquaintance a few years ago. If it is the same, my observation and experience may be of some service to those suffering now.

"It was introduced into my stock, in the fall of 1853, by one of my own cows, which, in the spring of that year, I had sent down to my brother in Brooklyn, to be used during the summer for milk. She was kept entirely isolated throughout the summer, and in November was sent up by the boat. There were no other cattle on the boat at the time, nor could I learn that she had come in contact with any in passing through the streets on her way to the boat; and she certainly did not, after leaving it, until she mingled with her old companions, all of whom were then, and long afterward, perfectly well. After she had been home about two weeks, we noticed that her appetite failed, and her milk fell off: she seemed dull and stupid, stood with her head down, and manifested a considerable degree of languor.

"Soon her breathing became somewhat hurried, and with a decided catch in it; she ground her teeth; continued standing, or, if she lay down, it was only to jump up again instantly. Her cough increased, and so, too, a purulent and bloody discharge from her nostrils and mouth. The excrement was fetid, black, and hard.

"In this case, we twice administered half a pound of Epsom-salts, and afterward, a bottle of castor-oil. Very little but a temporary effect was produced by these doses.

"The symptoms all increased in intensity; strength diminished; limbs drawn together; belly tucked up, etc.; until the eight day, when she partly lay, and partly fell down, and never rose again.

"In a *post-mortem* examination, the lungs were gorged with black, fetid blood; the substance of them thickened and pulpy. The pleura and diaphragm also showed a good deal of disease and some adhesion. This cow, on her arrival here, was put in her usual place in the stable, between others. She remained there for two or three days after she was taken sick, before we removed her to the hospital.

"In about three weeks from the time she died, one and then the other of those standing on either side of her were attacked in the same way, and with but two days between. This, certainly, looks very much like contagion; but my attention had not before been called to this particular disease, and to suppose inflammation or congestion of the lungs contagious was so opposed to my preconceived notions, that I did not even then admit it; and these animals were suffered to remain with the others until their own comfort seemed to require the greater liberty of open pens.

"One of them was early and copiously bled twice, while Epsom-salts were administered, both by the stomach and with the injective-pump. The other we endeavored to keep nauseated with ipecacuanha, and the same time to keep her bowels open by cathartic medicine. All proved to be of no avail. They both died,—the one in ten, the other in thirteen days. Before these died, however, others were taken sick. And thus, later, I had eight sick at one time.

"The leading symptoms in all were the same, with minor differences; and so, too, was the appearance after death, on examination.

"Of all that were taken sick (sixteen) but two recovered; and they were among those we did the least for, after we had become discouraged about trying to cure them. In all the last cases we made no effort at all, but to keep them as comfortable as we could. In one case, the acute character of the disease changed to chronic, and the animal lived six or eight weeks, until the whole texture of the lungs had become destroyed. She had become much emaciated, and finally died with the ordinary consumption.

"At the time the first case appeared, I had a herd of thirty-one animals, all valuable Ayrshires, in fine condition and healthy. In all the first cases, I had a veterinary surgeon of considerable celebrity and experience, and every ordinary approved method of treatment was resorted to and persevered in. The last cases—as before intimated—we only strove to make comfortable.

"After I had paid the third or fourth forfeit, I began to awake up to the idea that the disease was, in a high degree, contagious, whether I would have it so or not; and that my future security was in prevention, and not in remedy. I therefore separated all the remaining animals; in no instance having more than two together, and generally but one in a place.

"All were removed from the infected stalls, and put into quarantine. Isolated cases continued to occur after this for some weeks, but the spread of the disease was stayed; nor did a single case occur after this, which we did not think we traced directly to previous contact.

"It is impossible to account for the first case of which I have spoken. But, as the cow in that case was put into a sale-stable in New York while waiting for the boat,—though there were no cattle then present,—yet I have supposed it not unlikely that diseased animals had been there, and had left the seeds of the disease.

"But, account for this case as we may,—and I have no doubt it is sometimes spontaneous,—I feel convinced it is very highly contagious; and that the only safety to a herd into which it has been introduced, is in complete isolation,—and in this I feel as convinced that there is safety. My cattle were not suffered to return to the barn-yard or to any part of the cattle-barns, except as invalids were sent to 'the hospital' to die, until late the next fall, *i.e.*, the fall of 1854. In the mean time, the hay and straw had all been removed; the stables, stalls, cribs and all thoroughly scrubbed with ashes and water, fumigated, and whitewashed with quick-lime. I have had no case since, and am persuaded I should have avoided most of those I had before, if I had reasonably admitted the evidence of my senses in the second and third cases. E. P. PRENTICE.

MOUNT HOPE, June 14th, 1860."

The author's experience with the disease, during the last year in New Jersey, proves the efficacy of remedial agents when applied in the early stages of the disease. Late in the spring of 1861, Mr. J. E. Hancock, of Burlington County (residing near Columbus, N. J.), purchased some cattle in the Philadelphia market, which, after they were driven home, he turned in with his other stock. Soon after this purchase, one of the animals sickened and died. This was in August; after which time Mr. H. lost eight cows,—having, at the time of the death of the last animal, some five others sick with the same disorder.

The author was called in, December 8th, 1861, and the five animals then placed under his treatment. On the 12th of December, in the same year, one of these cows, at his suggestion, was killed, which, upon the *post-mortem* examination, beautifully illustrated the character of the disease. The right lung was comparatively healthy; the left one completely hepatized, or consolidated, and so enlarged as to fill up the left cavity of the chest to its utmost capacity. This lung weighed thirty pounds. There was no effusion in the chest, but there was considerable adhesion of the *pleura-costalis* and *pleura-pulmonalis*. All the other tissues appeared to be healthy.

To the remaining animals, was administered the following; aqua ammonia, three drachms; nitric ether, one ounce; pulverized gentian-root, half an ounce; mixed with one quart of water, and drenched three times a day. The last thing at night was given a teaspoonful of phosphate of lime, mixed in a little feed, or in gruel. Setons, or rowels, in the dewlap are also very beneficial. Under this treatment they all did well.

Soon after the introduction of the disease into this herd, it found its way to the herd of William Hancock, a brother of the former gentleman, who had an adjoining farm. In this herd one cow died, and the disease was found by the author developed in four more cows and two oxen, all of which—with a single exception—did well under the above treatment. The disease afterward showed itself in the herd of John Pope, half a mile distant, who lost nine animals by it.

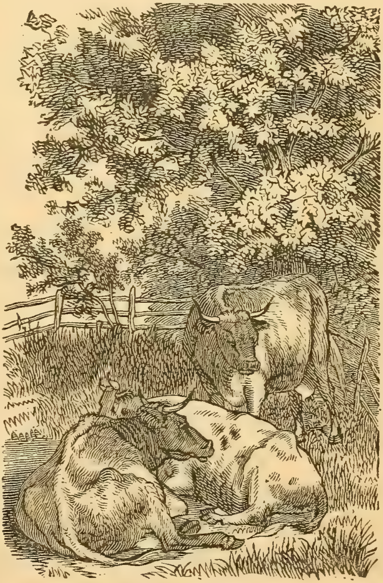
Thursday, December 19th, was selected for the purpose of making an examination of the Hancock herds; but, after some ten or twelve animals had been examined and all pronounced tainted with the disease, the owners concluded to stop the investigation, expressing themselves dissatisfied with the result, as not one of the animals examined had shown any symptoms of disease. In order to convince them of the correctness of the diagnosis, a cow was selected and destroyed, which the Hancocks believed to be in perfect health. Upon opening the animal, several small patches of hepatized lung were brought into view. Upon making a longitudinal section of the lump, as both were involved, they presented a red, speckled appearance. All the other tissues were healthy. The symptoms in these cases were quite different from any which had been previously seen in an experience of three years with the disease in and about Philadelphia, inasmuch as they were not preceded by cough; in fact, cough did not appear in many of the animals at any time during the progress of the disease. The animals looked, ate, and milked well, previously to the development of the disease, so that the owners were thrown completely off their guard by these deceptive symptoms of health. Knowing the uncertain character of this disease, and wishing to stay its ravages, a suggestion was made by the author as to the propriety of having the entire herd killed for beef. This was done the more readily, as the sale of the meat is legalized in Europe, it being regarded as uninjured, and therefore wholesome meat. This suggestion was acted upon, and thus these two farms were rid of this dreadful scourge at one blow.

Mr. A. Gaskill, of Mount Holly, N. J., purchased a cow from one of the Hancocks, for his own family use, which was sent to Mr. Frank Lippincott's to pasture and turned in with Mr. L.'s own herd. Soon after, this cow sickened and died. This was soon followed by the loss of six of Mr. L.'s own cattle,—three oxen, two cows, and one steer. From this herd, it was communicated to the Widow Lippincott's, who occupied a neighboring farm; as also to Mr. Cleavenger's, who lost four animals; and to Mr. Smith's, who had, at one time, seven animals sick; and from Cleavenger's to Noaknuts, who lost two cows. Some two or three cows, belonging to Mr. Logan, in the same neighborhood, got upon the road and broke into Mr. Lippincott's pasture, mixing with his herd. As soon as Mr. Logan was informed of the fact, he isolated these cows by enclosing them in a pen at some distance from his other cattle; but they managed to break out, and mingled with his other stock. It could scarcely be expected that his herd could escape the disease, considering the exposure to which they had been subjected. The disease manifested itself in the herds of several other farmers in the country, but space will not allow a more extended notice of the subject.

The treatment which has been found most successful in this country is as follows, all of which has been tested by the author upon various occasions: In the acute, inflammatory stage of the disease, give ten drops of Flemming's tincture of aconite in water, every four hours, until a change takes place; follow this with aqua ammonia, three drachms; nitric ether, one ounce; pulverized gentian-root, one half an ounce; water, one quart. Drench three times a day, and give, late in the evening, a tablespoonful of phosphate of lime, in a little feed, or drench with gruel. Put setons, or rowels in the dewlap, so as to have a dependent opening.

This course has been found very advantageous. Or, the following will be found quite satisfactory; nitrate of potash, two drachms; camphor, half a drachm; tartrate of antimony, half a drachm; mix, and give in a little gruel, night and morning. Or, the following: Glauber-salts, four ounces; water, one pint; give twice a day. A gill of cold-drawn castor-oil, added to the above, would be beneficial. Continue until the bowels are freely opened. The following has also been found efficacious: sulphate of magnesia, eight ounces; nitrate of potash and pulverized Jamaica ginger-root, of each one ounce. Repeat as often as may be required. Apply externally the following ointment to the sides; biniodide of mercury, four drachms; castor-oil, half an ounce; lard, four ounces; mix for use.

Preventive measures.—1st. The complete isolation of all herds in which the disease has made its appearance. 2d. Such animals as show symptoms of the disease should be placed under proper treatment. 3d. In England, it is recommended that animals recovering from the disease should be fattened and slaughtered for beef, as they are not safe even after their apparent recovery. 4th. All animals beyond medical treatment should be killed and buried; recompense in part, at least, being made to the owners. 5th. No animal, healthy or diseased, should be allowed to run at large upon the public highway so long as the disease may exist in its neighborhood.



TAKING IT EASILY.

The united action of all those interested would soon rid the country of a disease which has smitten all Europe.

The author takes this occasion to acknowledge the receipt of two very ably written articles upon this subject, which, in consequence of their length and the comparatively limited space allotted, he is reluctantly compelled to omit. One is from the pen of R. McClure, V.S., and the other from Isaiah Michener, V.S. For the benefit of his readers, however, he desires to make a single extract from the last-named communication, without being considered as endorsing the opinion advanced therein :—

"I am inclined to favor the hypothesis that pleuro-pneumonia is produced by animalculæ, and that these enter the lungs by myriads, and thereby set up irritation and inflammation, which lead to all the phenomena and pathological conditions which are to be found upon dissection. This is my opinion of the cause of the malignant pleuro-pneumonia which has existed in the United States for the last seven years."

After writing the foregoing, the author was informed that this disease had made its appearance in Mr. Logan's herd, already mentioned as exposed. He was called to visit the herd of Mr. G. Satterthwaite, who likewise lost two cows, and had two cows and a calf sick at the time of sending for him.

PNEUMONIA.

There are two conditions of the lungs known as pneumonia,—one, the inflammatory, and the other, the congestive stage. The former may follow an attack of bronchitis, or it may have a spontaneous origin. The congestive is generally the result of cold suddenly applied to an overheated animal, causing a determination of blood to the lungs, which sometimes causes death by suffocation.

Symptoms.—The disease is preceded by a shivering fit; dry skin; staring coat; clammy mouth; short cough; Schneiderian membrane (of the nose) very much reddened; respiration hurried or laborious. In the congestive stage, upon applying the ear to the sides, no sound will be detected; while in the inflammatory stage, a crackling or crepitating sound will be distinctively heard.

Treatment.—In the congestive stage, plenty of pure air will be necessary. Bleed freely; and give in drench one pound of Glauber-salts, with two drachms of Jamaica ginger. Nothing more will be required by way of treatment.

In the inflammatory stage, bleeding should seldom be resorted to, except where the animal is in full condition. Apply the following blister to the sides, well rubbed in: oil of turpentine, one ounce; croton-oil, twelve drops; aqua ammonia, half an ounce; linseed-oil, four ounces; mix all together. Give internally one pound of salts in drench, and follow with one of the following powders every four hours: nitrate of potash, one ounce; tartrate of antimony and pulverized digitalis leaves, of each, one drachm; mix all together, and divide into eight powders. Or the following may be given with equal advantage: nitrate of potash, one and a half ounces; nitrate of soda, six ounces; mix, and divide into six powders; one to be given in wash or gruel every six hours.

PROTRUSION OF THE BLADDER.

This sometimes occurs during the throes in difficult cases of parturition in cows, and the aid of a skillful veterinary surgeon is requisite to replace the inverted bladder.

PUERPERAL FEVER.

This disease—milk fever, or dropping after calving—rarely occurs until the animal has attained mature age. The first symptoms make their appearance in from one to five or six days after parturition. It appears to be a total suspension of nervous function, independent of inflammatory action, which is suddenly developed, and, in favorable cases, as suddenly disappears. It is called dropping after calving, from its following the parturient state.

Symptoms.—Tremor of hind legs; a staggering gait, which soon terminates in loss of power in the hind limbs; pulse rises to sixty or eighty per minute; milk diminishing in quantity as the disease progresses; the animal soon goes down, and is unable to rise, moans piteously; eyes set in the head; general stupor; and slow respiration.

Treatment.—This disease, though generally regarded as a febrile disorder, will not yield to the general practice of taking blood, as a large majority of the cases so treated die. The bowels must be opened, but the veins never. Give Epsom-salts, one pound; Jamaica ginger, two ounces; dissolve in warm water, one quart, and drench. The author usually gives with good effect, some five or six hours after the salts, two ounces of nitric ether and one ounce of tincture of opium, in half a pint of water. Rub well in, along the back and loins, the following: strong mustard, three ounces; aqua ammonia and water, each one and a half ounces. Some modifications in the treatment of this disease, as well as of most others, will be necessary under certain circumstances, which can only be determined by the veterinary practitioner.

QUARTER EVIL.

In some sections of the country, this disease—known by the other names of black quarter, and joint murrain—is quite common among young cattle, and is generally fatal in its termination. There is little or no warning of its approach. The first animals in a herd to be attacked are generally those in a full, plethoric condition.

Symptoms.—The joints suddenly become swollen; and so painful as to produce severe lameness, particularly in the hind parts. General irritative fever exists in the system, attended with great tenderness of the loins; the head is poked out; eyes red and bulging; the roots of the horns, as well as the breath, are hot; the muzzle dry, and nostrils expanded; pulse rises to seventy or eighty, full and hard; respiration is hurried; the animal is constantly moaning, and appears to be unconscious of surrounding objects; the swelling of the limbs extends to the shoulder and haunch; the animal totters, falls and dies in from twelve to twenty-four hours.

Treatment.—Early bleeding is requisite here, to be followed by active purgatives; after which, give one of the following powders every half hour: nitrate of potassa, two ounces; tartrate of antimony and pulverized digitalis, of each one and a half drachms; mix, and divide into eight powders. These should not be renewed. Cold linseed tea should be freely given.

RABIES.

Hydrophobia in cattle is the result of the bite of a rabid dog, from which bite no animal escapes. The effects produced by the wound made by the teeth of such an animal, after the virus is once absorbed into the circulation of the blood, are so poisonous that all treatment is useless. The proper remedies must be instantly applied to prevent this absorption, or the case is utterly hopeless. Among men, nine out of every ten bitten by rabid dogs escape the terrible effects resulting from this dreadful disorder, without resorting to any applications to prevent it. It is a well-established fact, that men, when bitten by dogs, are generally wounded in some part protected by their clothing, which guards them from the deleterious effects of the saliva which covers the teeth, and which, at such times, is deadly poison. The teeth, in passing through the clothing, are wiped clean, so that the virus is not introduced into the blood; hence the comparatively few cases of rabies occurring in man. When, however, the wound is made upon an exposed surface, as the flesh of the hand, or of the face, this fatal disease is developed in spite of every precaution, unless such precautions are immediately taken. For this reason, cattle when bitten, do not escape the disease.

Symptoms.—The animal separates itself from the rest of the herd, standing in a kind of stupor, with the eyes half-closed; respiration natural; pulse quickened; temperature of body and limbs natural; the slightest noise agitates, causing the eyes to glare and exciting bellowing; the bark of a dog produces the most violent effects; the animal foams at the mouth and staggers as it walks; if water is offered, the muzzle is plunged into it, but the victim cannot drink; in making the effort, the most fearful consequences are produced. The animal now seeks to do mischief,—and the quicker it is then destroyed, the better.

Treatment.—This must be applied quickly, or not at all. The moment an animal is bitten, that moment the wound should be searched for, and when found, should be freely opened with a knife, and lunar caustic, caustic potash, or the per-manganate of potash at once applied to all parts of the wound, care being taken not to suffer a single scratch to escape. This, if attended to in time, will save the animal.

RED WATER.

This disease derives its name from the color of the urine voided in it. It is one of the most common complaints of horned cattle, and one of the most troublesome to manage.

Symptoms.—Respiration hurried; rumination ceases; a high degree of fever presented; the animal moans, arches the back, and strains in passing the urine, which is tinged with blood, or presents the appearance of pure blood. Prof. Gamgee, of the Edinburgh Veterinary College, says: "The cause is almost invariably feeding on turnips that have grown on damp, ill-drained land; and very often a change of diet stops the spread of this disease in the byre. Other succulent food, grown under similar circumstances, may produce the same symptoms, tending to disturb the digestive organs and the blood-forming process.

"In the course of my investigations as to the cause of various cattle-diseases, and of red water in particular. I have found that it is unknown on well-drained farms and in dairies where turnips are used only in a moderate degree. The lands of poor people furnish the roots most likely to induce this disorder; and I can confirm the statement of the late Mr. Cumming, of Elton, who, in his very interesting essay upon this subject, says, particularly in reference to Aberdeenshire, that it is 'a disease essentially attacking the poor man's cow; and to be seen and studied, requires a practice extending into the less favorably situated parts of the country. On large farms, where good stock is well kept, and in town dairies, where artificial food is used to supplement the supply of turnips, it is seldom now seen.'

"*Symptoms.*—General derangement attracts the dairyman's attention, and, upon observing the urine which the animal has voided, it is seen to be of a red, or of a reddish brown, or claret color; sometimes transparent, at others clear. The color increases in depth; other secretions are checked; the animal becomes hide-bound, and the milk goes off. Appetite and rumination are suspended; the pulse becomes extremely feeble and frequent, though—as in all debilitating, or anæmic, disorders—the heart's action is loud and strong, with a decided venous pulse, or apparent regurgitation, in the large veins of the neck.

"In some cases, if even a small quantity of blood be withdrawn, the animal drops in a fainting state. In red water, the visible mucous membranes are blanched, and the extremities cold, indicating the languid state of the blood's circulation and the poverty of the blood itself. Constipation is one of the most obstinate complications; and many veterinary surgeons—aware that, if the bowels can be acted on, the animal is cured—nave employed purgatives in quantities far too large, inducing at times even death. Occasionally, diarrhœa is one of the first, and not of the unfavorable, symptoms."

Treatment.—Give one pint of linseed-oil; clysters of soap and water should be freely used; and give plenty of linseed-tea to drink. When the urine is abundant, give one ounce of tincture of opium, with one drachm of powdered aloes, three times, at intervals of six or eight hours.

RHEUMATISM.

This is a constitutional inflammatory affection of the joints, affecting the fibrous tissue and serous, or synovial membrane. It is caused by exposure to cold and wet; being quite common in low, marshy sections.

Symptoms.—Loss of appetite; upon forcing the animal to move, every joint seems stiffened; nose dry; coat staring; constipation is also an attendant symptom; the joints, one or more, become swollen and painful. This may be regarded as a metastic, or shifting disease; first one part, and then another, seems to be affected.

Treatment.—Mild purgatives should be used; one-half-ounce doses of colchicum-root pulverized will be found useful; one-ounce balls of pine-tar may also be given with advantage. As a local application, the author has found nothing to equal kerosene oil, one pint, to two ounces of aqua ammonia, well rubbed in, two or three times a day.

STRANGULATION OF THE INTESTINES.

This disease in cattle,—popularly styled Knot, or Gut-tie,—in consequence of the peculiar arrangement of the abdominal viscera, is of very rare occurrence. When, however, it does occur, the symptoms accompanying are those of inflammation of the intestines.

No kind of treatment will be successful, and the poor brute must suffer until death comes to its relief.

THRUSH IN THE MOUTH.

Aptha, or thrush in the mouth, is a vesicular disease of the mouth, sometimes occurring as an epizoötic. It is often mistaken for blain,—inflammation of the tongue, or black tongue,—and usually occurs in the winter, or early in the spring. It appears in the form of vesicles, or pustules all over the mouth, occasionally extending to the outside of the lips. These pustules break, discharging a thin, sanious fluid, leaving minute ulcers in their places.

This disease yields readily to treatment, when it is properly applied. Three ounces of Epsom-salts, once a day for three or four days, should be given in drench; wash the mouth well with a solution of alum, tincture of myrrh, or vinegar and honey, and it will disappear in a few days.

TUMORS.

These enlargements so common in cattle, have been so admirably described, in the Veterinarian for 1843, by John Ralph, V. S.,—who has been so successful in the treatment of these morbid growths, that the benefit of his experience is here given. He says: "Of all the accidental productions met with among cattle, with the exception of wens, a certain kind of indurated tumor, chiefly situated about the head and throat, has abounded most in my practice.

"The affection often commences in one of the thyroid glands, which slowly but gradually increases in size, feels firm when grasped, and evinces very little tenderness. Generally the attendant is alarmed by a snoring or wheezing noise emitted by the animal in respiration, before he is aware of the existence of any tumefaction. This continues to increase, embracing in its progress the adjacent cellular and muscular tissues, and frequently the submaxillary and parotid glands. It becomes firmly attached to the skin through which an opening is ultimately effected by the pressure of pus from the centre of the tumor.

The swelling often presents an irregular surface, and various centres of maturation exist; but the evacuations only effect a partial and temporary reduction of its bulk, in consequence of the continued extension of the morbid growth and ulcerative process which often proceed towards the pharynx, rendering respiration and deglutition still more difficult, until at length the animal sinks from atrophy or *phthisis pulmonalis.*

"In the early part of my practice, having been frustrated in my attempts to establish healthy action in these ulcers, and referring to the works that I had on surgery for information, I concluded that they bore some resemblance to cancer in the human being, and determined to attempt extirpation. Subsequently, numerous cases have occurred in which I have successfully carried that determination into effect. I have had some instances of failure, which failure always arose from some portion of the morbid growth having been left.

"In the first stage, I have reason to believe that the tumor may be dispersed by the general and topical use of the iodurets. After the suppuration, I have tried them in vain.

"As soon as the nature of the tumor is clearly developed, I generally attempt its removal, and, when most prominent by the side of the larynx, I proceed in the following manner:—Having cast the beast, turned the occiput toward the ground, and bolstered it up with bundles of straw, I proceed to make an incision through it, if the skin is free, parallel with, and over, and between the trachea and *sterno-maxillaris*, extending it sufficiently forward into the inter-maxillary spaces. If I find it firmly attached to the apex of the tumor, I then enclose it in a curvilinear incision and proceed to detach the healthy skin to beyond the verge of the tumor.

"Its edges being held by an assistant, the knife is directed downwards through the subcutaneous parts, and all those that exhibit the slightest change from healthy structure are removed.

"By tying any considerable blood-vessel before dividing it, and by using the handle of the scalpel and the fingers in detaching the portion of the parotid gland towards the ear, the hemorrhage was always inconsiderable.

"The wound is then treated in the ordinary way; except that detergents and even antiseptics are often needed to arouse healthy action, and the addition of some preparation of iodine is often made to the digestive. In directing the constitutional treatment, our chief aim must be to support the animal system with plenty of gruel until rumination is restored.

"I need not note that the operation should be performed after the animal has fasted some hours.

"As the success of the operation depends on an entire removal of the diseased parts, and as the submaxillary and parotid glands, with important branches of nerves and blood-vessels, are often enveloped therein, we must not hesitate to remove the former, nor to divide the latter. It has occasionally happened that a rupture has been made in the œsophagus, or pharynx, during the operation. In that case, a portion of the gruel with which the animal is drenched escapes for a few days; but I always found that the wound healed by granulation, without any particular attention.

"The weight of these tumors varies from a few ounces to some pounds. One that I removed from a two-year-old Galloway bullock, weighed six pounds and a quarter. A considerable portion of the skin that covered it was excised and included in the above weight. It comprehened one of the parotid glands, and I had to divide the trunk of the carotid artery and jugular vein.

"This affection may be distinguished from parotiditis and other *phlegmasiæ* by the action of constitutional disturbance, and heat, and tenderness, and by the lingering progress it makes. I was once called to a bull laboring under alarming dyspnœa that had gradually increased. No external enlargement was perceptible; but on introducing my hand into the mouth, a large polypus was found hanging from the *velum palati* into the pharynx, greatly obstructing the elevation of the epiglottis and the passage of food. After performing tracheotomy, to prevent suffocation, I passed a ligature around its pedicle in the way suggested by the old anatomist, Cheselden.

"A section of one of these tumors mostly displays several abscesses, with matter varying in consistency and often very fetid, enclosed in what seems to me to be fibro-cartilaginous cysts, the exterior of which sometimes gradually disappears in the surrounding more vascular abnormal growth. Osseous matter (I judge from the grating of the scalpel upon it) occasionally enters into the composition of the cysts.

"I have treated this affection in cattle of the Long-horned, Short-horned, Galloway, and Highland breeds; and from the number of bulls in this class of patients, have reason to conclude that they are more liable to it than the female.

"About twelve months ago, I examined the head of a cow, on the right facial region of which there existed an enormous tumor, extending from the eye to the lips, and which I mistook during life for a periosteal enlargement. On cutting into it, my mistake was evident. There was scarcely a trace of the original bones beneath the mass; even those forming the nasal sinuses on that side were replaced by a formation much resembling the cysts before alluded to, and full of abscesses. The progress of the disease was decisively marked in the inferior rim of the orbital cavity, where the osseous matter was being removed, and the morbid structure deposited."

ULCERS ABOUT THE JOINTS.

Occasionally, the joints assume a tumefied appearance, generally ulcerating, and causing painful wounds.

Treatment.—The application of one part of alum to two parts of prepared chalk, powdered and sprinkled upon the parts, is usually all that is required.

WARBLES.

It has been a prevalent opinion among farmers, that warbles are so many evidences of the good condition of their cattle. It must, however, be borne in mind that the warbles are the *larvæ* of the *œstrus bovis*, which is said to be the most beautiful variety of gad-fly. This fly, judging from the objects of its attack, must be particularly choice in its selection of animals upon which to deposit its eggs, as it rarely chooses those poor in flesh, or in an unhealthy condition. From this circumstance, probably, has arisen the opinion above-mentioned.

HOME AGAIN.

These warbles—or *larvæ* of the *œstrus bovis*—so nearly resemble bots in the horse—or *larvæ œstrus equi*—that, were it not for their increased size, they might readily be mistaken the one for the other. There is, however, one other difference, and that is in the rings which encircle the body; those of the former being perfectly smooth, while those of the latter are prickly, and from one third to one half smaller.

The author was called, in the year 1856, to see the prize cow, Pet, belonging to James Kelly, of Cleveland, Ohio, whose extraordinary yield of butter and milk had been reported in the *Ohio Farmer*, a short time previous to his visit. This animal was found by him in rather poor condition; the causes of which he could only trace to the existence of these worms, comfortably located, as they were, beneath the animal's hide, and forming small tumors all along the spinal column, each being surrounded by a considerable quantity of pus. A number of these were removed by means of a curved bistoury and a pair of forceps, since which time—as he has been informed—the animal has rapidly improved, regaining her former good condition.

Some may urge that this is an isolated case; but an examination of cattle for themselves, will convince them to the contrary. It may be added, that two other cows, belonging to the same gentleman, were also examined at the same time,—one of them being in good condition, and the other, out of condition. From the back of the latter several of these insects were removed, since which time she also has much improved. The former was entirely free from them. These cows were all kept in the same pasture, received the same care, and were fed on the same food, and at the same time; and as the removal of these larvae has been productive of such beneficial results, have we not a right to infer that these insects are injurious?

If we go further and examine, in the spring of the year, all cattle which are subject to them, instead of finding them in the fine condition which one would naturally expect,—considering the abundance of fresh young grass whose vigorous life they may incorporate into their own,—they are out of condition, and out of spirits, with a laggard eye, a rough coat, and, in some cases, a staggering gait, as though their strength had failed in consequence.

How shall such attacks be prevented? During the months of August and September this gad-fly is busily engaged in depositing its eggs. Some are of the opinion that they are placed on the hairs of the animal; others, that the skin is perforated, and the egg deposited in the opening, which would account for the apparent pain manifested by cattle at and after the time of such deposit. Be this as it may, it is certain that the maggot works its way into the muscular fibre of the back, and depends upon the animal's blood for the nourishment which it receives.

The author has been informed, by persons in whom he ought to have confidence, that the *free use of the card*, during the above-named months, is a specific protection against the attacks of the *œstrus bovis*. He repeats this information here, not without diffidence; since so large a majority of stock-owners evince, by their lack of familiarity with the practical use of this convenient and portable instrument, an utter disbelief in its reliability and value.

WORMS.

Cattle are not so subject to worms proper as are the other domestic animals; nor, when these parasites do exist, is any injurious effect apparent, except it be in the case of young calves of a weakly constitution. Worms are most commonly located in the small intestines, and cause there considerable irritation, and consequently, general emaciation, or at least a tendency to it.

The cause, however, is easily removed by administering oses of sulphate of iron, one-half drachm each, in molasses once or twice a day.

WORMS IN THE BRONCHIAL TUBES.

Inflammation of the bronchial tubes is often caused by worms of the *strongylus* species. Upon examination after death, the bronchial passages are completely blocked-up by these hangers-on.

Symptoms.—A rough, staring coat; hide-bound; painful cough; respiration hurried, etc.

Treatment.—But little can be done by way of treatment in this disease. The administration of small doses of spirits of turpentine has, in some instances, proved successful.

SURGICAL OPERATIONS.

CASTRATION.

The period most commonly selected for this operation is between the first and third months. The nearer it is to the expiration of the first month, the less danger attends the operation.

Some persons prepare the animal by the administration of a dose of physic; but others proceed at once to the operation when it best suits their convenience, or that of the farmer. Care, however, should be taken that the young animal is in perfect health. The mode formerly practised was simple enough:—a piece of whip-cord was tied as tightly as possible around the scrotum. The supply of blood being thus completely cut off, the bag and its contents soon became livid and dead, and were suffered to hang, by some careless operators, until they dropped off, or they were cut off on the second or third day.

It is now, however, the general practice to grasp the scrotum in the hand, between the testicles and the belly, and to make an incision in one side of it, near the bottom, of sufficient depth to penetrate through the inner covering of the testicle, and of sufficient length to admit of its escape. The testicle immediately bursts from its bag, and is seen hanging by its cord.

The careless or brutal operator now firmly ties a piece of small string around the cord, and having thus stopped the circulation, cuts through the cord, half an inch below the ligature, and removes the testicle. He, however, who has any feeling for the poor animal on which he is operating, considers that the only use of the ligature is to compress the blood-vessels and prevent after-hemorrhage, and, therefore. saves a great deal of unnecessary torture by including them alone in the ligature, and afterwards dividing the rest of the cord. The other testicle is proceeded with in the same way, and the operation is complete. The length of the cord should be so contrived that it will immediately retract, or be drawn back, into the scrotum, but not higher, while the ends of the string hang out through the wound. In the course of about a week, the strings will usually drop off, and the wounds will speedily heal. There will rarely be any occasion to make any application to the scrotum, except fomentation of it, if much swelling should ensue.

A few, whose practice cannot be justified, seize the testicle as soon as it escapes from the bag, and, pulling violently, break the cord and tear it out. It is certain that when a blood-vessel is thus ruptured, it forcibly contracts, and very little bleeding follows; but if the cord breaks high up, and retracts into the belly, considerable inflammation has occasionally ensued, and the beast has been lost.

The application of *torsion*—or the twisting of the arteries by a pair of forceps which will firmly grasp them—has, in a great degree, superseded every other mode of castration, both in the larger and the smaller domesticated animals. The spermatic artery is exposed, and seized with the forceps, which are then closed by a very simple mechanical contrivance; the vessel is drawn a little out from its surrounding tissue, the forceps are turned around seven or eight times, and the vessel liberated. It will be found to be perfectly closed; a small knot will have formed on its extremity; it will retract into the surrounding surface, and not a drop more of blood will flow from it; the cord may then be divided, and the bleeding from any little vessel arrested in the same way. Neither the application of the hot iron, nor of the wooden clamps, whether with or without caustic, can be necessary in the castration of the calf.

A new instrument was introduced in France, some few years since, for this purpose, called the *acraseur*,—so constructed as to throw a chain over the cord, which is wound up by means of a screw working upon the chain, and at the same time the cord is twisted off. No bleeding follows this method of operating.

This instrument is constructed upon the same principle as the *acraseur* for use in the human family, for the removal of hemorrhoids, etc., the dimensions of the two only varying.

The advantages resulting from the use of this instrument over all other methods are, that the parts generally heal within a week,—the operation is not so painful to the animal,—it is less troublesome to the operator,—also to the owner of the animal,—and lastly, it is a safer and more scientific operation. Its success in France soon gave it a reputation in England, and recently it has been introduced by the author into this country, and with the best results. Contractors, hearing of the success attending this new mode of operating, have visited him from all parts of the country to witness its performance, and not one has returned without leaving an order for this instrument,—so well convinced have they been of its decided superiority over all other methods.

TRACHEOTOMY.

In consequence of the formation of tumors about the throat in cattle, from inflammation of the parotid gland, blain, etc., so characteristic of this species of animals, it sometimes becomes necessary to perform this operation in order to save their lives. It never fails to give instant relief.

After the animal has been properly secured,—which is done by an assistant's holding the nose with one hand, and one of the horns with the other,—the operator draws the skin tight over the windpipe with the thumb and fingers of his left hand; then, with the scalpel in his right, cuts through the skin, making an incision about three inches long, dissecting up the skin on each side, which brings the *trachea*, or windpipe, in full view. He then cuts out a piece of the cartilaginous rings, about two inches long and about half an inch wide. This simple operation has saved the lives of very many valuable animals. The wound readily heals, and seldom leaves any perceptible blemish, if the work is properly performed.

SPAYING.

To secure a more uniform flow and a richer quality of milk, cows are sometimes spayed, or castrated. The milk of spayed cows is pretty uniform in quality; and this quality will be, on an average, a little more than before the operation was performed. In instances where the results of this operation have been carefully noted,—and the operation is rarely resorted to in this country, in comparison with the custom in France and other continental countries,—the quality of the milk has been greatly improved, the yield becoming regular for some years, and varying only in accordance with the difference in the succulence of the food.

The proper time for spaying is about five or six weeks after calving, or at the time when the largest quantity of milk is given. There seems to be some advantages in spaying for milk and butter dairies, where attention is not paid to the raising of stock. The cows are more quiet, never being liable to returns of seasons of heat, which always more or less affect the milk, both in quantity and quality. They give milk nearly uniform in these respects, for several years, provided the food is uniformly succulent and nutritious. Their milk is influenced like that of other cows, though to a less extent, by the quality and quantity of food; so that in winter, unless the animal is properly attended to, the yield will decrease somewhat, but will rise again as good feed returns. This uniformity for the milk-dairy is of immense advantage. Besides, the cow, when old and inclined to dry up, takes on fat with greater rapidity, and produces a juicy and tender beef, superior, at the same age, to that of the ox.

The following method of performing this operation is sanctioned by the practice of eminent veterinary surgeons in France:—

Having covered the eyes of the cow to be operated upon, she is placed against a wall, provided with five rings firmly fastened and placed as follows: the first corresponds to the top of the withers; the second, to the lower anterior part of the breast; the third is placed a little distance from the angle of the shoulder; the fourth is opposite to the anterior and superior part of the lower region; and the fifth, which is behind, answers to the under-part of the buttocks. A strong assistant is placed between the wall and the head of the animal, who firmly holds the left horn in his left hand, and with his right, the muzzle, which he elevates a little. This done, the end of a long and strong-plaited cord is passed through the ring which corresponds to the lower part of the breast, and fastened; the free end of the cord is brought along the left flank, and through the ring which is below and in front of the withers. This is brought down along the breast behind the shoulder and the angle of the fore-leg in order to pass it through the third ring; then it must be passed around against the outer angle of the left hip, and fastened, after having been drawn tightly to the posterior ring, by a simple bow-not.

The cow being thus firmly fixed to the wall, a cord is fastened by a slip-noose around her hocks, to keep them together in such a manner that she cannot kick the operator, the free end of the cord and the tail being held by an assistant. The cow thus secured cannot, during the operation, move forward, nor lie down, and the operator has all the ease desirable, and is protected from accident.

The operator next—placed opposite to the animal's left flank, with his back turned a little toward the head of the animal—cuts off the hair which covers the hide in the middle of the flanks, at an equal distance between the back and hip, for the space of thirteen or fourteen centimetres in circumference (the French *centimetre* is rather more than thirty-nine one hundredths of an inch); a convex bistoury is placed, opened, between his teeth, the edge out, the joints to the left; then, with both hands, he seizes the hide in the middle of the flank, and forms of it a wrinkle of the requisite elevation, running lengthwise of the body. The assistant seizes with his right hand the right side of this wrinkle; the operator takes the bistoury and cuts the wrinkle, at one stroke, through the middle; the wrinkle having been suffered to go down, a separation of the hide is presented, of sufficient length to admit the introduction of the hand; the edges of the hide are separated with the thumb and forefinger of the left hand, and in like manner the abdominal muscles are cut through, for the distance of a centimetre from the lower extremity of the incision made in the hide,—the *iliac* slightly obliquely, and the *lumbar* across; a puncture of the peritoneum, at the upper extremity of the wound, is then made with the straight bistoury; the buttoned bistoury is then introduced, and moved obliquely from above to the lower part, up to the termination of the incision made in the abdominal muscles.

The flank being opened, the right hand is introduced into the abdomen, and directed along the right side of the cavity of the pelvis, behind the paunch, and underneath the rectum, to the matrix; after the position of these viscera is ascertained, the organs of reproduction, or ovaries, are searched for, which are at the extremity of the matrix; when found, they are seized between the thumb and fore-finger, detached completely from the ligaments which keeps them in their place, and by a light pull, the cord and the vessels, the uterine or Fallopian tube, are separated at their place of union with the ovarium, by means of the nails of the thumb and forefinger, which present themselves at the point of touch, thus breaking the cord and bringing away the ovary.

The hand is again introduced into the abdominal cavity, and the remaining ovaries brought away in like manner. A suture is then placed of three or four double threads, waxed at an equal distance, and at two centimetres, or a little less, from the lips of the wound, passing it through the divided tissues; a movement is made from the left hand with the piece of thread; having reached that point, a fastening is made with a double knot, the seam placed in the intervals of the thread from the right, and as the lips of the wound are approached, a fastening is effected by a simple knot, with a bow, care being taken not to close too tightly the lower part of the seam, in order to allow the suppuration, which may be established in the wound, to escape. The wound is then covered up with a pledget of lint, kept in its place by three or four threads passed through the stitches, and the operation is complete.

It happens, sometimes, that in cutting the muscles before mentioned, one or two of the arteries are severed. Should much blood escape, a ligature must be applied before opening the peritoneal sac; since, if this precaution is omitted, blood will escape into the abdomen, which may occasion the most serious consequences.

For the first eight days succeeding, the animal should have a light diet, and a soothing, lukewarm draught; if the weather should be cold, cover with a woollen covering. She must be prevented from licking the wound, and from rubbing it against other bodies. The third day after the operation, bathe morning and evening about the wound with water of mallows lukewarm, or anoint it with a salve of hog's lard, and administer an emollient glyster during three or four days.

Eight days after the operation, take away the bandage, the lint, the fastenings, and the thread. The wound is at that time, as a general thing, completely cicatrized. Should, however, some slight suppuration exist, a slight pressure must be used above the part where it is located, so as to cause the pus to leave, and if it continues more than five or six days, emollients must be supplied by alcotized water, or chloridized, especially in summer. The animal is then to be brought back gradually to her ordinary nourishment.

In some cows, a swelling of the body is observable a short time after having been spayed, attributable to the introduction of cold air into the abdomen during the operation; but this derangement generally ceases within twenty-four hours.

Should the contrary occur, administer one or two sudorific draughts, such as wine, warm cider, or a half-glass of brandy, in a quart of warm water,—treatment which suffices in a short time to restore a healthy state of the belly,—the animal at the same time being protected by two coverings of wool.

The only precaution, in the way of management, to be observed as a preparative for the operation is, that on the preceding evening not so copious a meal should be given. The operation should also be performed in the morning before the animal has fed, so that the operator may not find any obstacle from the primary digestive organs, especially the paunch, which, during its state of ordinary fullness, might prevent operating with facility.

The advantages of spaying milch-cows are thus summed up by able French writers: First, rendering permanent the secretion of milk, and having a much greater quantity within the given time of every year; second, the quality of milk being improved; third, the uncertainty of, and the dangers incident to, breeding being, to a great extent, avoided; fourth, the increased disposition to fatten even when giving milk freely, or when, from excess of age or from accidental circumstances, the secretion of milk is otherwise checked; fifth, the very short time required to produce a marketable condition; and sixth, the meat of spayed cattle being of a quality superior to that of ordinary cattle.

This operation would seem to have originated in this country. The London Veterinary Journal of 1834 contains the following, taken from the United States Southern Agriculturist:—"Some years since, I passed a summer at Natchez, and put up at a hotel there, kept by Mr. Thomas

Winn. During the time that I was there I noticed two remarkably fine cows, which were kept constantly in the stable, the servant who had charge of the horses, feeding them regularly three times a day with green guinea grass, cut with a sickle. These cows had so often attracted my attention, on account of the great beauty of their form, and deep red color, the large size of their bags, and the high condition in which they were kept, that I was at length induced to ask Mr. Winn to what breed of cattle they belonged, and his reasons for keeping them constantly in the stable in preference to allowing them to run in the pasture, where they could enjoy the benefit of air and exercise, and at the same time crop their own food, and thereby save the labor and trouble of feeding them? Mr. Winn, in reply to these inquiries, stated that the two cows which I so much admired were of the common stock of the country, and he believed, of Spanish origin; but they were both spayed cows, and that they had given milk either two or three years. Considering this a phenomenon (if not in nature at least in art), I made further inquiries of Mr. Winn, who politely entered into a very interesting detail, communicating facts which were as extraordinary as they were novel. Mr. Winn, by way of preface, observed that he, in former years, had been in the habit of reading English magazines, which contained accounts of the plowing-matches which were annually held in some of the southern counties of England, performed by cattle, and that he had noticed that the prizes were generally adjudged to the plowman who worked with spayed heifers; and although there was no connection between that subject and the facts which he should state, it was, nevertheless, the cause that first directed his mind into the train of thought and reasoning which finally induced him to make the experiments, which resulted in the discovery of the facts which he detailed, and which I will narrate as accurately as my memory will enable me to do it, after the lapse of more than twenty years. Mr. Winn's frequent reflections had (he said) led him to the belief 'that if cows were spayed soon after calving, and while in a full flow of milk, they would continue to give milk for many years without intermission, or any diminution of quantity, except what would be caused by a change from green to dry, or less succulent food." To test this hypothesis, Mr. Winn caused a very good cow, then in full milk, to be spayed. The operation was performed about one month after the cow had produced her third calf; it was not attended with any severe pain, or much or long continued fever. The cow was apparently well in a few days, and very soon yielded her usual quantity of milk, and continued to give freely for several years without any intermission or diminution in quantity, except when the food was scarce and dry; but a full flow of milk always came back upon the return of a full supply of green food. This cow ran in the Mississippi low grounds or swamp near Natchez, got cast in deep mire, and was found dead. Upon her death, Mr. Winn caused a second cow to be spayed. The operation was entirely successful. The cow gave milk constantly for several years, but in jumping a fence stuck a stake in her bag, that inflicted a severe wound, which obliged Mr. Winn to kill her. Upon this second loss, Mr. Winn had two other cows spayed, and, to prevent the recurrence of injuries from similar causes with those which had occasioned him the loss of the first two spayed cows, he resolved to keep them always in the stable, or some safe enclosure, and to supply them regularly with green food, which that climate throughout the greater part of, if not all, the year enabled him to procure. The result, in regard to the last two spayed cows, was, as in the case of the first two, entirely satisfactory, and fully established, as Mr. Winn believed, the fact, that the spaying of cows, while in full milk, will cause them to continue to give milk during the residue of their lives, or, until prevented by old age. When I saw the last two spayed cows it was, I believe, during the third year that they had constantly given milk after they were spayed. The character of Mr. Winn (now deceased) was highly respectable, and the most entire confidence could be reposed in the fidelity of his statements; and as regarded the facts which he communicated in relation to the several cows which he had spayed, numerous persons with whom I became acquainted, fully confirmed his statements."

In November 1861, the author was called to perform this operation upon the short-horn Galloway cow, Josephine the Second, belonging to Henry Ingersoll, Esq., of this city. This cow was born May 8th, 1860. The morning was cold and cloudy. About ten o'clock the cow was cast, with the assistance of R. McClure, V.S., after which she was placed under the influence of chloric ether. He then made an incision, about five inches in length, through the skin and walls of the abdomen, midway between the pelvis bone and the last rib on the left side, passing in his right hand, cutting away the ovaries from the Fallopian tubes with the thumb-nail. The opening on the side was then closed by means of the interrupted suture. The animal recovered from the influence of the anæsthetic in about fifteen minutes, when she was allowed to rise, and walk back to her stall.

Upon the morning of the second day succeeding the operation, the animal was visited and found to be in good spirits, apparently suffering very little pain or inconvenience from the operation, and the wound healing nicely.

Since that time, he has operated upon some twenty cows, all of which, with a single exception, have thus far proved satisfactory.

Several of these cows are under the direction of a committee from the Philadelphia Society for promoting Agriculture, whose duty it is to have a daily record kept of each cow's yield of butter and milk, for one year from the time of spaying. Their report will be perused by the agricultural community with much interest.

The author's own experience will not justify him in speaking either in favor of, or against, this operation; as sufficient time has not as yet elapsed to satisfy him as to its relative advantages and disadvantages. He, however, regards the operation as comparatively safe. The French estimate the loss at about fifteen per cent., and the gain at thirty per cent. Of those upon which he has operated, not a single animal died.

A LIST OF MEDICINES USED IN TREATING CATTLE.

The medicines used in the treatment of the diseases of cattle, are essentially the same as those in vogue for the diseases of the human being and the horse,—the only difference being in their combination and the quantities administered.

Absorbents.—Medicines which destroy acidities in the stomach and bowels; such as chalk, magnesia, etc.

Alteratives.—Medicines which restore the healthy functions of secretion, by gradually changing the morbid action in an impaired constitution. Those in most common use are Æthiops mineral, antimony, rosin, sulphur, etc., which form the principal ingredients in all condition-powders, and are chiefly useful in diseases of the skin, such as hide-bound, mange, surfeit, etc.

Alterative Powder.—Sulphur pulverized, one pound; black antimony, one half a pound; nitrate of potassa, four ounces; sulphate of iron, one half a pound; linseed meal, one pound; mix well; dose, one half an ounce, night and morning.

Antacids.—Agents which neutralize, by their chemical action, acids in the stomach; as ammonia, carbonate of potassa, chalk, lime-water, magnesia, and soda.

Anthelmintics.—Remedies used for the expulsion of worms from the stomach and intestines. These may act chemically or by their cathartic operation. The most reliable are Æthiops mineral, nux vomica, preparations of mercury, wormwood, etc.

ANTHELMINTIC POWDERS.—Nux vomica, in one half-drachm doses, two or three times daily, to an ox or cow; for calves, the dose must be diminished, according to age.

ANTIDOTES.—Medicines which neutralize the effects of poisons by a chemical union, forming an insoluble compound, or a mild, harmless one. Alkaline solutions are antidotes for the mineral acids; as soap in solution, a simple remedy, and always at hand. Lard, magnesia, and oil are antidotes for poisoning by arsenic; albumen,—in the form of the white of an egg,—milk, etc., for corrosive sublimate, and other mercurial preparations.

ANTISEPTICS.—Medicines which prevent putridity in animal substances, and arrest putrefaction, when already existing. These are used both externally and internally. The chief specifics of this class are the acids, alcohol, ammonia, asafœtida, camphor, charcoal, chloride of lime, cinchona, ether, and opium.

ANTISPASMODICS.—Medicines which exert their power in allaying inordinate motions or spasms in the system, arising from various causes, such as debility, worms, etc. Those most generally in use are ammonia, asafœtida, camphor, cinchona, ether, lactacarium, mercury, and opium.

ANTISPASMODIC DRAUGHT.—Tincture of opium, one ounce; nitric ether, two ounces; water, one-half pint. Mix for drench; if repeated, it should be followed by a purgative, as soon as the spasms have subsided. Or, use the following: sulphuric ether, one to two ounces; water, one-half pint. Mix for drench; repeat every hour, if necessary.

Aromatics.—Medicines possessing a grateful, spicy scent, and an agreeable, pungent taste; as anise-seed, cardamoms, cinnamon, cloves, ginger, etc. They are principally used in combination with purgatives, stomachics, and tonics.

Astringents.—Medicines which serve to diminish excessive discharges, as in diabetes, diarrhœa, etc. The principal agents of this class are the acids, alum, chalk, lime-water, opium, and the sulphate of copper, lead, iron, or zinc.

Astringent powder.—Opium, one drachm; prepared chalk, half an ounce; Jamaica ginger, six drachms. Mix, and divide into four powders; one to be given every hour, in a little flour gruel. Or, the following: opium, one drachm; catechu, two drachms; prepared chalk, one ounce. Mix, and divide into four powders; to be given as before.

Cardiacs.—Cordials—so termed, from their possessing warm and stimulating properties—given to invigorate the system.

Cathartics.—Medicines—also known as purgatives—which cause free evacuations of the bowels. The only purgatives used by the author in his cattle practice, as a general rule, are aloes, cream of tartar, Epsom-salts, lard and linseed-oil. These answer all the indications, where purgatives are useful; indeed, no better purgative for cattle can be found than Epsom-salts, combined with a carminative or aromatic drug, such as ginger.

Caustics.—Substances which burn or destroy parts, by combining with them and causing their disorganization; used to destroy unhealthy action, or morbid growths, such as foul ulcers, foul in the foot, warts, etc. The most powerful remedial of this class is actual cauterization with a red-hot iron; caustic potash, lunar caustic, nitrous and sulphuric acids, permanganate of potash, etc., are also used.

CORDIALS.—Best brandy, three ounces; orange peel, one drachm; tepid water, one pint. Mix all together, for one dose. Or, this for a single dose: ale, one pint; Jamaica ginger, two drachms. Or, the following, also a single dose: allspice, three drachms; ginger, one drachm; caraway seeds, two drachms.

DEMULCENTS.—Mucilaginous medicaments, which have the power of diminishing the effects of stimulating substances upon the animal system. Of this class, garden rue, or marsh-mallow, gum-arabic, and gum-tragacanth are the most useful.

DETERGENTS.—Agents which remove foulness from ulcers.

DETERGENT POWDER.—Prepared chalk, two ounces; alum, one ounce. Mix; to be sprinkled on the part, after washing with Castile-soap and water. This powder is also an admirable application for foot-rot in sheep.

DIAPHORETICS.—Agents which increase the natural discharge through the pores of the skin, and in some animals induce perspiration.

DIGESTIVES.—Medicines which promote suppuration.

DIGESTIVE OINTMENT.—Mix together equal portions of spirits of turpentine and lard. Or, mix together with a gentle heat the following: Venetian turpentine, one ounce; lard, one ounce; pulverized sulphate of copper, two drachms. Or this, mixed: rosin, two ounces; spirits of turpentine, one ounce; red precipitate, one-half an ounce; lard, two ounces.

DIURETICS.—Medicines that stimulate the action of the kidneys, and augment the secretion of urine. These are very useful in swellings of the legs or body. Take of nitrate of potash and rosin, each six drachms; mix, and divide in three powders; one to be given daily. Or, the following: spirits of turpentine, half an ounce; Castile-soap, one ounce; Jamaica ginger one drachm; opium, one drachm. Mix: and divide in two balls; one to be given each day.

EMOLLIENTS.—Medicines which relax the lining tissues, allay irritation, and soften the parts involved,—generally of a mucilaginous, or oily character. Lard, linseed meal, and marsh-mallows are chiefly used.

LITHONTRIPTICS.—Medicines possessing the power of dissolving *calculi*, or stones in the urinary passages; composed principally, according to the researches of modern chemists, of lithic or uric acid. The preparation most successfully employed by the author in such cases is muriatic acid, in doses of from one to two drachms, in a pail of water, once or twice a day.

NARCOTICS.—Medicines that stupefy, and produce sleep. Belladonna, camphor, hyoscyamus and opium, are among the narcotics in common use.

NAUSEANTS.—Agents which cause loss of appetite, and produce the sensation of vomiting, without affecting it. For this purpose, aloes, tartrate of antimony, white hellebore, etc., are used.

PARTURIENTS.—Agents which act upon the uterus. In cases of difficult parturition, or calving, resort is occasionally had to them. Ergot of rye is the most powerful.

REFRIGERANTS.—Cooling applications, which reduce the temperature of the blood and body; as cold water, ether, lead-water, etc.

RUBEFACIENTS.—Medicines which gently irritate the skin, producing redness on white surfaces. Of this class, are aqua ammonia, creosote, mustard, turpentine, etc.

SEDATIVES.—Agents which depress the vital energies, without destroying life; as aconite, digitalis, hellebore, hydrochloric acid, hyoscyamus, opium, and tartrate of antimony.

TONICS.—Medicines which increase the action of the muscular system, giving strength and vigor to the animal. These are among the most useful remedies known to man, and are beneficial in all cases of debility, toning up the stomach, and improving the appetite and condition of the animal.

TONIC POWDER.—Pulverized gentian-root, one ounce; Jamaica ginger, one half an ounce; anise-seed, six drachms. Mix, and divide in eight powders; one to be given night and morning.

TRAUMATICS.—Medicines which excite the healing process of wounds; as aloes, friar's balsam, myrrh, rosin, sulphate of copper or zinc, tar, etc.

TRAUMATIC LOTION.—Mix tincture of aloes, one ounce; tincture of myrrh, two ounces. Or, melt together, tar, one ounce; rosin, two ounces; lard, four ounces. Or, mix sulphate of zinc, one drachm; rain-water, one half pint. Or, use the following, the celebrated friar's balsam; benzoin, in powder, four ounces; balsam of Peru, two ounces; Socotrine aloes, one half ounce; rectified spirits, one quart. Digest for ten or twelve days; then filter for use.

DOSES OF VARIOUS REMEDIES USED IN CATTLE PRACTICE.

Aconite.—[*Monk's hood; Wolf's bane.*] An active poison. Used as a sedative in tincture; ten to twenty drops in water.

Æthiops Mineral.—[*Hydrargyri Sulphuretum.*] One to two drachms.

Alcohol.—A stimulant; three to six ounces.

Allspice.—[*Pimento berries.*] Aromatic; two to four drachms.

Aloes.—Cathartic and tonic; tonic dose, one half to one drachm—cathartic, one to two ounces.

Alum.—[*Alumen.*] Irritant, astringent, and sedative; two to four drachms.

Ammonia.—[*Aqua ammonia; Liquor ammonia; Hartshorn.*] Principally used in combination with mustard, as an external irritant, and internally, as a diffusible stimulant; two to six drachms. Of carbonate of ammonia, three to six drachms.

Anise-seed.—[Fruit of the *Pimpinella Anisum.*] One to two drachms.

Antimony.—[*Sulphate of Antimony.*] Used in condition-powders; one to three drachms. Muriate of antimony. [*Oil, or butter, of antimony.*] Caustic; very good in foul in the foot. Tartarized antimony. [*Tartar emetic.*] One to four drachms. The author, in the last instance, varies from the dose prescribed by veterinary authors, never giving it in more than one-half-drachm doses, believing its action thus more certain and satisfactory.

ASAFŒTIDA.—Stimulant; two to four drachms.

AXUNGE.—[*Hog's Lard.*] Ointment, principally; may be used as purgative in doses of from one to one and a half pounds.

BALSAM OF PERU.—Stimulant, and tonic; two to four drachms.

BELLADONNA.—[*Deadly Nightshade.*] Narcotic, antispasmodic, and irritant poison; one to two drachms.

BENZOIN.—[*Gum Benjamin.*] Ointment; see TRAUMATICS.

CALOMEL.—[*Hydrargyri Chloridum.*] One half to one drachm.

CAMOMILE.—[*Anthemis.*] Stomachic, carminative, and tonic; one to two ounces.

CAMPHOR.—[*Camphora Officinarum.*] Narcotic and irritant; in small doses, sedative and stimulant; one to four drachms.

CANTHARIDES.—[*Spanish Flies.*] Internally, stimulant and diuretic; twenty to thirty grains. Externally, vesicant; used in form of ointment, or tincture.

CARAWAY.—[Fruit of the *Carum Carisi.*] Used chiefly for flavoring purposes.

CARDAMOMS.—[Fruit of the *Elettaria Cardamomum.*] Used to communicate an agreeable flavor to other medicines.

CATECHU.—[*Acacia Catechu.*] Astringent, and antiseptic; three to six drachms.

CHALK.—[*Carbonate of Lime; Calcis Carbonas.*] Two to three ounces.

Charcoal.—[*Carbo Ligni.*] Antiseptic; one half to one ounce.

Cinchona.—[*Peruvian Bark.*]. Astringent and tonic; one to two ounces.

Copper, Sulphate of.—[*Blue Vitriol.*] Tonic and astringent; two to four drachms.

Creosote.—[*Creosotum.*] A sedative, anodyne, astringent, narcotic, and irritant poison; fifteen to twenty drops.

Croton Oil.—[*Crotonis Oleum.*] Internally, as a cathartic, six to ten drops in linseed-oil; externally, as a counter-irritant.

Digitalis.—[*Fox Glove.*] Sedative and diuretic; one to two scruples.

Epsom-Salts.—[*Sulphate of magnesia.*] Cathartic; one pound, combined with ginger.

Ergot.—[*Spurred rye.*] Parturient; two to six drachms.

Ether.—Stimulant, narcotic, and anæsthetic; one to two ounces.

Gentian.—[Root of *Gentiana lutea*]. Stomachic and tonic; one to two ounces.

Ginger.—[*Zengiber officinale.*] Stomachic, carminative, and slightly tonic; one to two ounces.

Gum-arabic.—[*Gummi Acaciæ.*] Demulcent and emollient; one to two ounces.

Gum-tragacanth. Same action and same doses as the former.

Hellebore.—[*Helleborus.*] Irritant poison, and sedative; twenty to thirty grains.

Hyoscyamus.—[*Henbane.*] Narcotic, anodyne, and antispasmodic; ten to twenty grains.

IODINE.—[*Iodineum.*] Internally, as a tonic; two to three scruples; also as a tincture, and in ointments for reducing enlargements of the soft tissues.

IRON, SULPHATE OF.—[*Ferri Sulphas*; *Green Vitriol; Copperas.*] Irritant, astringent, and tonic; two to four drachms.

KOOSSO. Anthelmintic; two to four drachms.

LIME, CHLORIDE OF. Antiseptic; dose internally, one to two drachms.

LINSEED OIL. Cathartic; one pint.

LUNAR CAUSTIC.—[*Nitrate of Silver.*] Used as a caustic.

MAGNESIA.—[See EPSOM-SALTS.]

MARSH-MALLOW.—[*Altheæ Radix.*] Demulcent and emollient; principally used for poultices and fomentations.

MURIATIC ACID.—[*Hydrochloric Acid; Spirit of Salt.*] tonic, irritant, and caustic; dose internally, one to two drachms.

MUSTARD.—[*Sinapis.*] Counter-irritant; used principally as an external application.

MYRRH.—Stimulating tonic to unhealthy sores; seldom used internally.

NITRIC ACID.—[*Aqua fortis.*] Astringent and tonic; one to two drachms in water. Used also as a caustic.

NUX VOMICA.—[Seeds of *Strychnos.*] In large doses, a deadly poison; in medicinal doses, a powerful tonic and anthelmintic; one half to one drachm.

OPIUM.—[*Papaver Somniferum.*] Narcotic, sedative, anodyne, stimulant, and anti-spasmodic; two to four drachms.

POTASH, CARBONATE OF.—[*Potassæ Carbonas.*] Antacid and diuretic; three to six drachms.

POTASH, CAUSTIC.—[*Potassa fusa.*] Used only as a caustic.

POTASSA, PERMANGANATE OF.—Used externally as a caustic.

ROSIN.—Diuretic; two to three ounces.

SALT, COMMON.—[*Chloride of Sodium.*] Irritant, cathartic, stimulant, and antiseptic; one to one and a half pounds.

SALTS, GLAUBER.—[*Sulphate of Soda.*] Cathartic and diuretic; one to one and a half pounds.

SALTPETRE.—[*Nitrate of Potassa.*] Diuretic, febrifuge, and refrigerant; one half to one ounce.

SUBLIMATE, CORROSIVE.—[*Protochloride of Mercury.*] Seldom used internally; externally, caustic and stimulant.

SULPHUR.—[*Brimstone.*] Stimulant and laxative; three to four ounces.

SULPHURIC ACID.—Irritant, caustic, and astringent; two to three drachms.

TARTAR, CREAM OF.—[*Potassæ Tartras.*] Cathartic; three to four ounces.

TURPENTINE.—Stimulant, anthelmintic, diuretic, and laxative; one to two ounces.

ZINC, SULPHATE OF.—[*White Vitriol.*] Astringent and tonic; one to two drachms.

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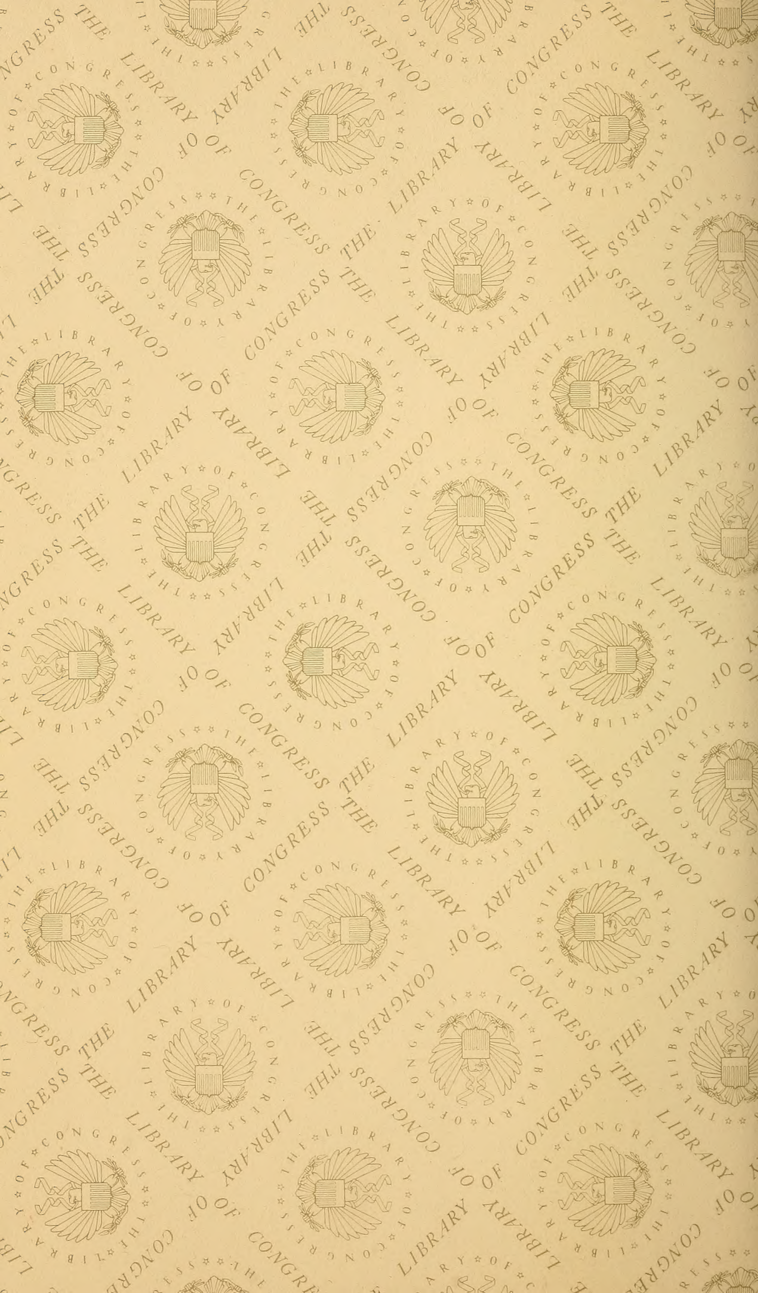

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